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ABSTRACT

Designed for pre-camp and in-camp studies, this text presents materials relative to the Mohican School in the Out-of-Doors (Perrysville, Ohio). The following areas are covered: (1) the daily camp schedule (includes sections on community life, utilization of the senses, and the art of observation); (2) an historical/geographical review of the Mohican Area; (3) the act of creative expression (includes samples of journal entries, student poetry, etc); (4) the art of conservation and ecological exploration (includes trailside facts and manners, pond study, creekbed study, outdoor mathematics, a compass game, tree identification, tree observation, fern observation, wildflower observation, bird observation, soil study, etc); and (5) weather study (vocabulary for ecology and weather, wind speed estimation, chill factor, weather forecasting, and humidity chart). The text is divided into reading materials (pre-camp) and worksheets (in-camp) which include maps, pictures, drawings, charts, etc. (JC)

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MOHICAN SCHOOL IN THE OUT-OF-DOORS

OUTDOOR EDUCATION PLACES THE STUDENT IN THE WORLD'S BEST EQUIPPED LABORATORY. HERE, FIRST HAND EXPERIENCE IS CONTINUALLY AVAILABLE. HERE, TOO, AN APPRECIATION FOR THE PRESERVATION OF OUR RAPIDLY DIMINISHING OUTDOOR INHERITANCE CAN BE LEARNED.

Box 150, Route #2
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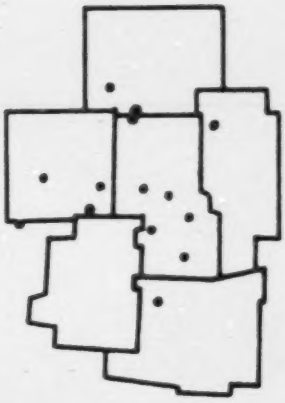

A TEACHER-GUIDED STUDY IN YOUR OUTDOOR LABORATORY

RC008735

the PIONEER

STUDENT TEXTBOOK

₱2 50

1974

NAME – _____

DATE – _____ _____

1974-75

Mohican School In The Out-Of-Doors
Route #2 - Box 150
Perrysville, Ohio 44864
Telephone (419) 938-3710

Dear Student:

The wonderful outdoors was man's first school room. It was there where man first learned to survive and became the superior animal. It was there where he learned to use his intelligence to keep warm, dry, find shelter, food and build great civilizations.

Today we spend much more time indoors than our forefathers did. In most respects we know far less about the outdoors than did our forefathers. Yet, the outdoors is very important to us. Our lives depend on the food which is grown outdoors. We require clean air to breathe and clean water to drink. *Our* future as living things depend upon how we treat the world - our environment - because we cannot survive in an overly polluted world. We need to learn more about how to care for our environment. We, also, need the outdoors for physical recreation and mental and spiritual re-creation.

We will soon be studying together outdoors. The lessons will be learned differently than the ones you learn in your classroom, but they will be no less important. Our work at the outdoor school is a part of your year's schooling. Think of this experience as being *outdoor* education. We will move you to an outdoor setting in order to study some subjects that are better learned in an outdoor situation.

We are giving you this booklet a few weeks before you come to the outdoor school so that you can read it and be thinking about the experience. Please read the Table of Contents page. We would like you to especially read the white pages before you come to the outdoor school.

The history of the Mohican School goes back to 1961 when Madison Local Schools started an outdoor education program. In 1964, a county committee was formed to open an outdoor school. The Martha Holden Jennings Foundation of Cleveland financed the committee expenses. A three year federal grant was secured under the Elementary-Secondary Education Act of 1965. For three years the Mohican School was a Title III project (innovative and exemplary programs). In 1969, the Jennings Foundation again came to the aid of the program. The Mohican School was sponsored by Springfield Local Schools from 1965 to 1971. The school is now a non-profit institution. Over 25,000 students have participated in the program since 1961.

The school uses the facilities provided by the Wooster Presbytery Outdoor Center on the southern shore of Pleasant Hill Lake in southern Richland County.

We of the permanent staff of the Mohican School sincerely hope you enjoy your stay at the outdoor school. With your cooperation we will learn and have fun during our time together.

Sincerely,

Ronald Reed
Project Director

RR:cjf

DEDICATION

This textbook is dedicated to Cindy Cox for winning the 1973-74 poetry contest with the following entry:

WINTER NATURE

Birds speckled white

Hiding in the bushes.

Exclamation mark trees, white faced to the north

Erect on snow covered hills.

Ice covered pond

Frosted with white fallen snow.

Hills laced with ice

Etched in beauty

Nature at its best at M. O. S.

Cindy Cox, 6th grade
Lucas Elementary
Lucas

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Please Note: The textbook includes colored pages for a purpose. Generally speaking, *the white pages are to be read and/or filled out before* the students attend the outdoor school. We may refer to the white pages during outdoor school sessions but they were written to help in pre-outdoor school study. The other colored pages will often be used at the outdoor school, depending, of course, upon the season. Many classes with unusual emphases or special seasonal activities will include handouts which are not a part of this booklet. Special handouts will be inserted into the textbooks when they are used. Pages marked with an (*) can, also, be used for follow-up activities by students at home, at their schools or on field trips after the outdoor school experience.

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"It takes all sorts of in and outdoor schooling
To get adapted to my kind of fooling."

Robert Frost

DAILY SCHEDULE
1974-75

7:15	Reveille
7:55	Flag Raising
8:00	Breakfast
8:40	Kapers
9:15	First Activity Period
11:30	Weather Reading
12:00	Dinner
1:00	Teacher Time
2:00	Second Activity Period
3:30	Option Time
4:55	Flag Lowering
5:00	Supper
5:45	Rest Period
6:30	Third Activity Period
8:00	Social Time
8:30	Dismiss for Bed
9:45	Lights Out

PERMANENT STAFF

Ronald Reed, Project Director
Cheryl Fackelman, Secretary
John Evans, Teacher
Deborah Rex Reed, Teacher

David Tucker, Teacher
Jerry Dunlap, Teacher

RESOURCE PEOPLE

Richland Astronomical Society
Local Ornithologist
Parents
Richland County Game Protector
Richland Soil & Water Conservation District
Richland County Agriculture Extension Service
Mansfield-Richland County Health Department
Ohio Department of Natural Resources Wildlife Division
Ohio State Department of Education
Ohio Conservation & Outdoor Education Association

United States Department of Agriculture
Soil & Water Conservation Service
United States Department of the Interior Fish &
Wildlife Service

Kingwood Center

Ashland College
Bluffton College
Capital University
Ohio State University Mansfield Campus
California State College

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COMMUNITY LIFE AT THE OUTDOOR SCHOOL

I Before Breakfast

1. All students are to remain in their dorms and quiet until the counselor announces it is time to get up.
2. Students should not waste time after reveille. Each cabin will be responsible for flag raising before breakfast once during the week. If your cabin does not have flag raising remain in the cabin until the counselor announces breakfast.

II Dining Room Procedure

1. At mealtime students are to walk into the dining room and stand behind a chair at their assigned tables. We will sing, say or have a silent grace.
2. After the grace, students may sit down. Food serving instructions will be given to each group. One student hopper is in charge of bringing more food from the counter to the table. One hopper will be in charge of cleaning up at the end of the meal. (Everyone should have an opportunity to participate.)
3. Table manners are important and make for more pleasant eating.
   a. Students are to put napkin on their lap and use it when necessary.
   b. When seated, begin by passing the food to the right. This avoids confusion.
   c. "Please" and "thank you" are always used when asking for something to be passed.
   d. Bread or toast is broken before being spread with butter or jelly.
   e. It is impolite to talk with food in your mouth.
   f. It is improper to put elbows on the table until all have finished eating.
   g. When everyone at the table has finished the main part of the meal, dessert is eaten all together.
   h. It is proper to say "please excuse me" if you need to leave the table. Students are not to leave their seats unless excused by an adult.
4. Quiet, but many happy voices in the dining room make eating an enjoyable time of the day.
5. All students will be dismissed by tables from the dining room after announcements.

III Rest Period

1. All students are to remain in their dorms during the rest period. Students may quietly work on or read their workbooks or library books at this time.

IV Jobs

All of us have jobs to do to keep our community running smoothly. Your job or kaper is important; do it every day.

V Dorms

1. Please obey the dorm rules posted in each dorm.
2. No dorm raids are permitted.
3. If you find a lost article please give it to an adult.
4. No food is permitted in the dorms.

VI Inspection

1. Inspection of dormitories will take place each day during lunch.
2. An Honor Flag will be presented to the dormitory with the highest total points out of a possible 25.
3. Inspection rules and procedures are posted in each dormitory.

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OUR SENSES

While we are at the outdoor school we want to use our eyes, nose, ears, tongue, and fingers to learn. Our senses are very important in learning about things, but some of us do not use them. Often we do not listen, we do not look, or we miss a smell. While at outdoor school - be alert - tune in your senses - you will learn more!

We LOOK, LISTEN, and THINK for ideas in our Language Arts Classes in Outdoor Education. We could call LOOK, LISTEN, and THINK our textbooks. Sometimes we will use one, sometimes all three. Their use is unlimited because they have so many "pages".

Language arts includes anything we do that is creative including singing, sketching, storytelling, journal keeping, writing stories or poems, and discussing the people who lived there years ago. You can see that our class sessions will be varied and interesting with so many things to do in so few days.

OBSERVATION

Name_____ School_____

Using all your senses try to fill all three columns by observing only those things in your assigned area.

PLANTS	ANIMALS	OTHERS
1.	1.	1.
2.	2.	2.
3.	3.	3.
4.	4.	4.
5.	5.	5.
6.	6.	6.
7.	7.	7.
8.	8.	8.
9.	9.	9.
10.	10.	10.
11.	11.	11.
12.	12.	12.
13.	13.	13.
14.	14.	14.
15.	15.	15.
16.	16.	16.
17.	17.	17.
18.	18.	18.
19.	19.	19.
20.	20.	20.
21.	21.	21.
22.	22.	22.
23.	23.	23.

SOME INTERESTING HISTORY

"After a hundred years
Nobody knows the place -
Agony, that enacted there,
Motionless as peace. . ."
Emily Dickinson

Little do we realize that the history of our own counties have many interesting facts and thrilling adventures just waiting for us to discover. No national government was formed here, and no famous Indian war was fought here, but governments were formed, and the pioneers *did* fight the Indians in our counties. These and many more interesting things happened in north central Ohio; so let us in an attempt to better understand the present, pause to appreciate the past.

Ancient Indians

Indians lived in what we now call Richland, Ashland, Crawford, Knox, and Huron counties for many many years. The Mound Builders, considered to be some of the most advanced Indians of ancient times, lived in Ohio. Mounds built by these ancient Indians have been found right in our counties. A famous mound is located south of Fredericktown. About four miles west of the outdoor school two of these mounds have been discovered--one was eighty feet high! Some of these mounds were used as burial grounds by the Indians, and often the Indians buried the dead person's belongings with him in the mound. Clay pots, pipes, tools and weapons have been discovered as a result of opening such ancient graves.

While improving a road in the mid-1800's, pioneers discovered the bones of an ancient Indian who had been seven feet tall! The bones were discovered just a few miles west of the outdoor school.

As you walk over the paths of our school grounds you are on ground that was used by these ancient Indians many centuries ago. Who knows what discovery we of the Mohican School in the Out-Of-Doors might accidently make that would reveal life of long ago?

Late in ancient times the Erie Indians controlled most of what we now call Ohio. Later the Iroquois used Ohio mostly for hunting only. Ohio remained unsettled for years until the eastern Indians began to migrate across the state on their way west.

Recent Indians

The more recent Indians are not such a mystery to history because the white man recorded things about them first hand. Our counties were at one time or another the hunting grounds for the following tribes: Wyandots, Hurons, Ottawas, Delawares, and Shawnees. The Delawares had entered the state about 1750, held control of what we now call the outdoor school, and were the largest tribe in Richland County in 1764 - numbering about 600 warriors plus their families.

The best known Indian village of Richland County was a Delaware Settlement just a few miles from our school called Greentown.

In 1790, these Indians joined others in a war against the white man and were winning until "Mad Anthony" Wayne, sent by President Washington, defeated them in a battle in Northern Ohio called Fallen Timbers. Following Fallen Timbers the Indians signed the Treaty of Greene Ville and the Delawares of Richland County returned home.

Greene Ville Treaty

The southern boundary of Ashland County is a portion of the original Greene Ville Treaty line. The line was established at the Treaty of Greene Ville signed August 3, 1795, by General Anthony Wayne and several Indian chiefs. The treaty reserved all lands to the north of the line as Indian Lands and the Indians gave up all claims to the land south of the line for pioneer settlement. It is one of the most important treaties between the United States and the Indians. It, also, opened the way to the settlement and statehood for Ohio. The line crosses the 3 C Highway about six miles south of Loudonville.

After Wayne had defeated the Indians at Fallen Timbers in 1794, he moved into Fort Greene Ville for winter quarters. During the next spring and summer Wayne and the Indians met in many meetings to work out the peace details. By July, 1,130 Indians had gathered. Many famous Indians of the day were there: Blue Jacket, Little Turtle, Black Hoof, Bad Bird, and others. In August, the treaty was signed and sent to President Washington for his signature. Days of feasting and passing the peace pipe followed. The Indians were promised the lands north of the line, $20,000 worth of supplies, and a $9,500 payment yearly forever. The Indians lived up to their promises at Greene Ville much better than the pioneers and the United States government did. None of the Indian signers of the treaty ever fought the pioneers again and the Indians respected the line and moved north. However, the pioneers soon broke the agreement and crossed the line and the government later broke its promises and pushed the Indians farther west.

Famous Indian Names

Captain Pipe was of the Wolf branch of the Delawares and one of their fiercest fighters. He once helped in the torture of a white soldier named Col. William Crawford. According to the story, Crawford was stripped and had his hands tied together with one end of a rope. The other end of the rope was tied to a stake. The rope was long enough to allow him to walk around the stake. The Indians loaded their muskets with powder. They fired the muskets next to Crawford's body. This caused the powder to burn into the flesh, turning it black. The women then stood nearby and threw hot coals onto his body. Some of the coals burned his flesh and fell to the ground. Soon he was walking around the stake on a bed of hot coals. At one point he apparently fainted and fell to the ground. He was then scalped and had more hot coals poured over his body. It is said that he got to his feet once more. By morning, however, he was nothing but ashes.

On Pleasant Valley Road near the Mohican School a large rock was once known as Pipe's Cliff. Pipe's sister and family were supposed to have camped upon the summit of this rock one night. Some soldiers located their camp and fired upon the Indians. During the battle, Pipe's sister fell to her death from the rock. She was holding a child at the time and both were buried nearby.

Another of the Delaware chiefs was called *Thomas Armstrong* and had been educated by the pioneers. He was of the Turtle branch of the Delawares and once was chief of Greentown. It was said by some that he was a white man who had been captured as a boy by the Delawares and raised as an Indian.

Tom Lyons or "Old Leather Lips" was the name of another well-known Indian of Greentown and this part of Ohio. Much mystery surrounds the background of Tom Lyons. Confusion by historians is understandable because Tom Lyons was vain and

boastful and loved to tell tales about himself. Some of the tales were no doubt created by Lyons himself and were not true, but where truth begins and fiction ends nobody seems to be quite sure. He was described as the ugliest human being ever seen; with elephant-like skin and a thick lip that drooped over his chin. It was considered bad manners for pioneers to lock their doors at night and often in the early morning they would find "Old Leather Lips" sitting in front of their fireplace helping himself to their food! He claimed and boasted of having killed 99 white women and he was supposed to have the 99 tongues of his victims hanging on a string. Lyons used this string of tongues tale to frighten many early pioneer women. He would wander up to a cabin when only the woman of the house was at home and begin boasting. His boasting always gained him some food! How Lyons survived as he did living near the whites is a real wonder. His very name was used to frighten young boys when they would not behave. His looks, his boasting and bad manners angered and frightened the early pioneers.

Lyons was an old man when he came to this part of Ohio. It is said that he may have fought in the Revolutionary War. While in Richland County he lived for awhile in a cabin along the Clear Fork River in Worthington Township.

There are many accounts of how Leatherlips died. One historian claimed he died on an Indian reservation in 1824. Other historians claim he was murdered. One murder tale has it that Lyons was shot and buried in a swamp. Another murder tale accounts his death occurring near Haniwalt Mill, near Lexington. After a drinking and boasting spree in a Lexington tavern, he was followed by some pioneer roughnecks and murdered. An interesting gravestone was found once near Haniwalt Mill in a pioneer cemetery. The stone gives an account of an old Indian being buried nearby.

No matter which tales are true or which are not; Tom Lyons or "Old Leatherlips" remains the most colorful Indian of our past.

More Indian Facts

The Indians of this area grew corn, potatoes, and melons. The work in their gardens was done by the squaws. The warriors did the fighting and hunting. The Delaware warriors nicknamed themselves *Leni-lenape* which means "real men". The warriors loved to hunt bear, deer, and turkey. Their sports consisted of races, games of ball, throwing the tomahawk, shooting the bow and arrow, and horse races. They believed in one God called the Great Spirit, and worshipped him in colorful ceremonies.

When the War of 1812 broke out between the United States and Great Britain, the frontier settlers became uneasy about the presence of Indians near their homes. The Indians were inclined to fight on the British side in the war. Blockhouses were put up in different spots for protection as news spread all over the state that an Indian chief by the name of Tecumseh was uniting all tribes to go on the warpath. Actually Tecumseh's Indian forces had been defeated at Tippecanoe the year before (1811), but the pioneers still feared the power of the Shawnee warrior.

Fear broke out among many of the Richland County settlers that the Indians of Greentown might join Tecumseh and the military authorities decided to destroy Greentown. There were about 100 Indians at Greentown at the time and they had been peaceful since Fallen Timbers. A Captain Douglas was sent to make the Indians leave their village. Fearing trouble, Douglas went to gain the assist-

ance of James Copus, a pioneer who lived near the Indians and had taught the red men Christianity. The Indians loved and respected Copus and believed him to be an honest man. Douglas forced Copus against his will to talk the Indians into leaving their village. When the Indians left, a few deserters from Captain Douglas's garrison set fire to the village without any good reason. As the Indians turned and watched their homes burning in the distance they felt that they had been betrayed. This occurrence made enemies out of many of the peaceful Greentown Indians.

The Indians were taken to Mansfield and put under guard where one warrior and his daughter promptly escaped. Two soldiers followed the Indians and shot the warrior, scalped him, and then cut off his head and placed it on top of a pole in the middle of Mansfield.

North of what is now our school location lived a family by the name of Zimmers. The Zimmers family was one of the earliest to settle in this area, having arrived in 1809 about the same year as the family of James Copus. Seeking revenge for the burning of Greentown, a group of Indians walked into the Zimmers cabin one afternoon and murdered the entire family of six (including a friend that had been there visiting them, excluding the son who had been sent for help when the Indians had been seen coming).

Next the Indians turned on their old friend James Copus who they believed was responsible for the destruction of Greentown. They surrounded the Copus cabin and fired upon it for hours before giving up. When the battle was over a number of men were dead, including ten Indians and James Copus, who had been wounded and died in his own bed.

About this same time a grocery store owner was murdered and scalped on North Main Street in Mansfield by a group of Indians seeking revenge.

So you see our area has had its share of pioneer and Indian adventures as the white man and the Indian struggled to control this area.

Early Richland and Ashland Counties

Probably the first white man to set foot in our county was James Smith in the mid 1700's. He had been captured by the Indians in Pennsylvania, adopted and brought through here on a hunting trip. Richland became a county in 1808, but had no government until 1813. At first Richland County included what we now call Ashland County. In 1812, Mansfield numbered about 12 families.

The first settlers to come to Richland County arrived in about 1807. They settled near the Black Fork, the Clear Fork, (near Bellville) and the Rocky Fork (near Lexington). In 1808, Richland County was called Madison Township.

The village of Mansfield was surveyed and laid out by Gen. James Hedges, Jacob Newman, and Joseph Larwell in 1808. The first house built in the village was put up by Samuel Martin in 1808, but he was caught illegally selling whiskey to the Indians and had to leave the area. Mr. and Mrs. James Cunningham moved into the Martin house and in August of 1809, Mrs. Cunningham gave birth to the first white child born in Mansfield. She was named Matilda. The first male child was born to Mr. and Mrs. John Gilkinson in 1811.

The first house was built where the square is today and much of the activity

of the village centered around that area. A blockhouse was erected there early to protect the settlers from Indian attack. The first post office business was conducted on a large stump near the blockhouse. Lots were first sold in 1808 and in 1815 twenty-four houses stood in Mansfield. Two of the houses were blockhouses. In 1827-28 the village had grown to 270 people!

Johnny Appleseed

"Models for men, if they
would build the world
As Johnny Appleseed would
have it done. . ."
Vachel Lindsay

No account of early Richland County and nearby area would be complete without mentioning the most famous of pioneers from the area--*John Chapman*, or as he was better known - Johnny Appleseed. This man is known all over the United States for his adventures and deeds as a pioneer.

John Chapman was born in Massachusetts in 1775 and followed the frontier all his life. He left New England when it was "too civilized" and moved to Pennsylvania where he lived for a few years. When that state became too crowded he moved to Ohio and later to Indiana where he died in 1847.

He was kind, gentle and good-hearted man who was restless and loved to talk. His eyes were dark and he always wore old torn clothes. It was said he wore an old tin bucket on his head in which he cooked his meals while in the wilderness. He seldom wore shoes in summer or winter. He carried no weapon and he never killed anything, yet, he usually traveled alone in early forests full of wild animals. He was called "Appleseed John" because of his love for trees. He seemed to think it was his duty to plant fruit trees ahead of the pioneers so they would have fruit growing when they settled the land. He always carried a bag full of seeds. He would, also, return to his trees every so many months to see how they were doing. This business kept him on the move constantly. The Indians called him the "Great Medicine Man" and he never had any trouble with the red men. He was a preacher of the Swedenborgian beliefs. Johnny thought that he could talk to the dead of the "spirit land", and it was said that the reason he never married was because two of these female spirits were supposed to marry him after he was dead--*and so he waited!*

He spent much time in Richland County where he had relatives, and in Worthington Township where he had many

friends. He visited the Zimmers family just before they were scalped. Probably Johnny Appleseed walked on the ground that we are walking on at the outdoor school. See if you can find any apple trees! He became a hero in Mansfield when he walked barefooted from Mansfield to Mount Vernon to get a garrison of soldiers to come and protect the Richland County settlers from a possible Indian attack. He made it there and back in one night, even though he stopped at each home to warn them of the Indian uprising.

We have recorded just a few of the interesting things that happened in early north central Ohio, but now we have a better idea of how these early pioneers lived and what adventures they went through in the settling of our counties.

Muskingum Conservancy District

The Wooster Presbytery Outdoor Center, the Mohican School site, is located near the Pleasant Hill Lake. The lake is a part of the Muskingum Conservancy District. The District includes 14 dams and several lakes or reservoirs located from Charles Mill Reservoir near Mifflin southeast to the Ohio River. The main purpose of creating the district and building the dams was flood control. Other benefits have been storage of water, recreation, reforestation, and beauty.

Pleasant Hill Dam was completed in 1937 and the lake provides many hours of recreation to thousands of people each year.

Louis Bromfield

A few miles north of Mohican School is the home of the late Louis Bromfield, famous author and early conservationist. Bromfield won the Pulitzer Prize for literature while writing several novels about early Ohio and India among other topics. Some of his novels were made into motion pictures. He bought five worn out farms for experimental purposes. His home was named Malabar and it became famous for the experimental farming techniques that were conducted there. He stressed using natural fences and farming without artificial fertilizers long before either were popular. People visited the farm from all over the world to observe the "natural" techniques of building up the worn out soils of Malabar. Mr. Bromfield restored an old stage coach inn nearby and during summers Malabar Inn still serves meals to travelers. The State of Ohio has purchased both Malabar Farm and Malabar Inn and now operates them as a part of the Ohio Department of Natural Resources Park system.

Mr. Ronald Reed
Mr. John Evans

Credit should be given to the Ohio Genealogical Society, the Richland County Historical Society, the Mohican Historical Society, Malabar Farm, the Mansfield Public Library, and the many articles, histories and individuals, too numerous to mention, who were helpful to the above writers.

SOME GLACIAL HISTORY OF THE MOHICAN AREA

Note: This information is to be used with the two maps included in this textbook.

The map showing the Glacial Deposits of Ohio tells the story of what the glaciers did to Ohio's landscape during the Pleistocene era. In the geologic time table, this is called the Ice Age, and occurred from 1,000,000 years to 12,000 years ago when the glaciers retreated or melted back out of Ohio.

There are two very typical kinds of hills in Ohio: those that were left by glacial deposits and those which the glacier did not cover. Find these latter hills on the map in white, in the southeastern part of the state. These hills are very steep, very deeply stream-eroded through millions of years, and are of highly resistant bedrock sandstone. Their resistance to the forces of nature caused the major glacial division in the state.

All of the rest of Ohio was covered by the glaciers as they advanced from Canada and the north. On the map the colored section represents glaciation. The line between sandstone bedrock and the rest of Ohio is the glacial boundary line.

The hills of glacial deposits left behind when the glacier receded are called moraines. These represent the position of the edge of the ice as it melted back and melted down in one spot. End moraines are shown in dark green. Ground moraine, a more evenly spread till, is represented by light green on the map. Till is an unsorted mixture of sand, silt, clay and pebbles. This accumulation is made up of the remains of rock debris which the ice carried along as it "bulldozed" its way through the mountains and forests of Canada, and gouged 50 to 75 feet of soil and bedrock out of Canada's uplands and plains. These moraines of till are the second type of hill in Ohio, are less steeply sloping and more gently rounded and lower in elevation.

Ohio's bedrock is all sedimentary rock of limestone, sandstone and shale deposited when a warm sea covered Ohio 600,000,000 to 300,000,000 years ago. The limestone bedrock in western Ohio represents what was the bottom of the sea. It is now mostly covered by glacial till. In eastern Ohio, the bedrock is sandstone associated with the edge or shore of the sea. Shale, the third sedimentary rock grades into the limestone and sandstone and is sometimes present in both in alternating layers.

After the oceans drained away, the hills of Ohio were uplifted. During the millions of years that followed, the limestone hills being "softer" and less resistant to the forces of erosion than the sandstone hills in our area, were worn away by erosion. So the glaciers, as they advanced, spread over the leveled landscape and left the deposits of till, called moraines. The western glacial lobe spread east as well as south and advanced until it met the bedrock upland in eastern Ohio. This lobe is the Illinois glacier and occurred about 150,000 years ago. If you follow the boundary line of the glaciers across the state of Ohio, you will find that it makes a big point to the northwest where the east-west boundary of the Wisconsin glacier (green) intercepts the north-south boundary of the Illinoian (purple). This is called the glacial re-entrant and this is the only place in Ohio where this unique natural phenomenon occurs. This is the exact spot where Mohican School is located.

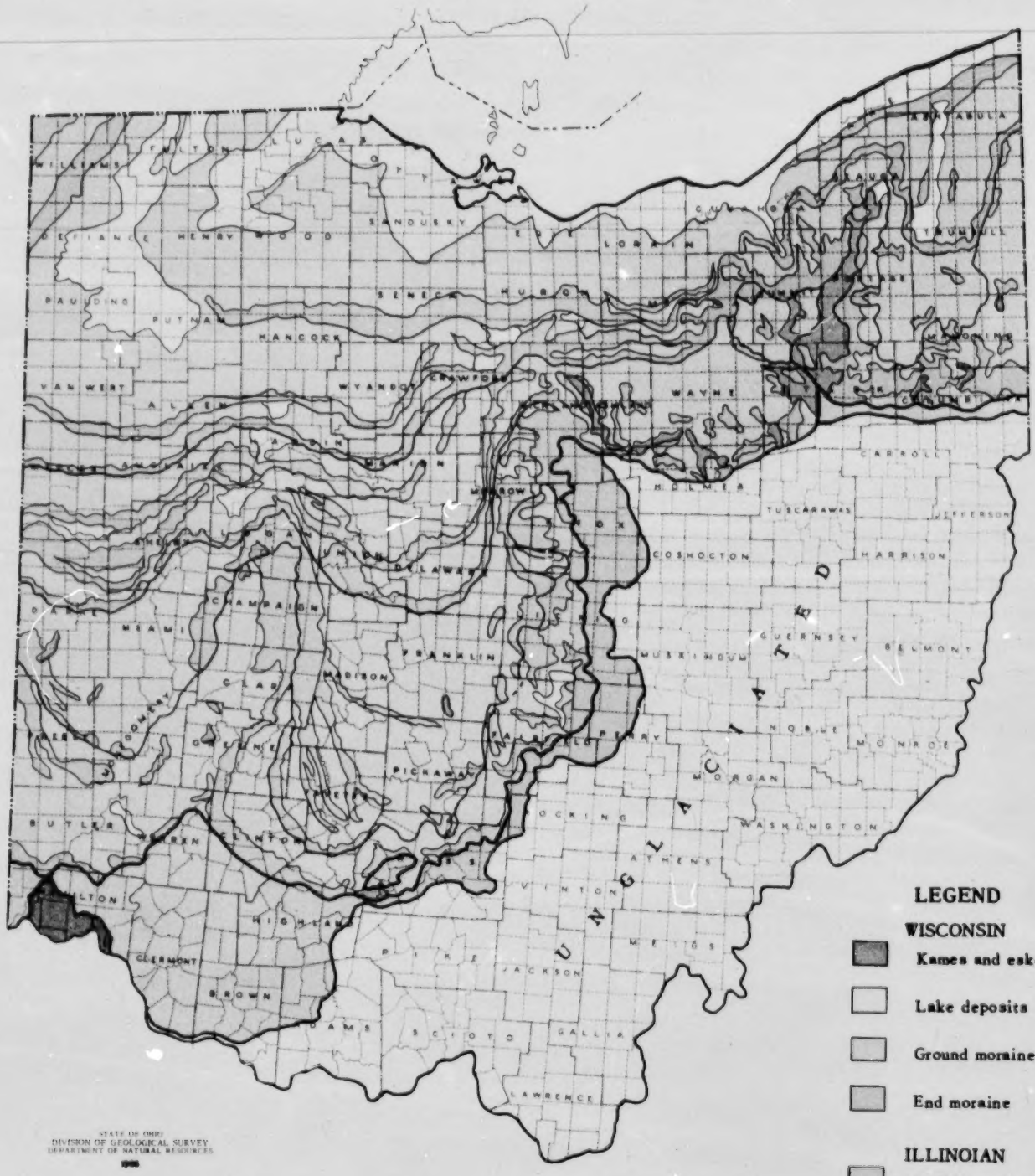
Three kinds of hills lie against each other at this point; the high bedrock sandstone bluffs (300,000,000 years old) are exposed at the dam, along the north and west shore of Pleasant Hill Lake and along Goon Road; the low rounded hills of Illinois till, 150,000 years old, meet the Wisconsin end moraines (17,000 years old) close to and north and east of the "kettle hole" on the Mohican Outdoor School map.

Now look on the Mohican School map and look for the words "outpost camp". This is about the spot pinpointed on your map where the three kinds of hills come together.

Mrs. Beatrice Sellner

QUESTIONS

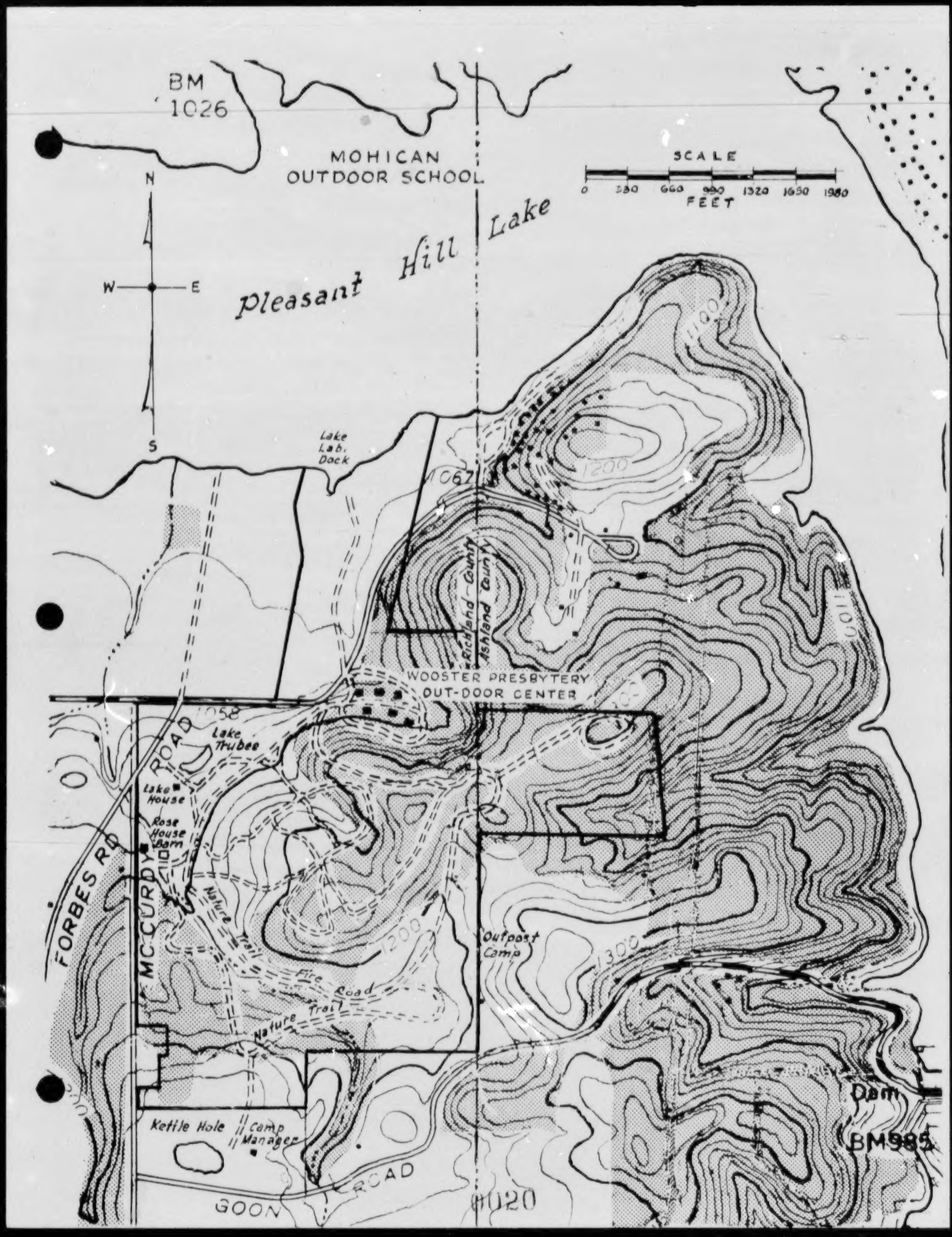
1. *On the map what does the colored portion represent?*
2. *How is the unglaciated portion of Ohio shown?*
3. *What percentage of Ohio is glaciated?*
4. *Do you live in the glaciated or unglaciated part?*
5. *What kind of story can you tell from glacial deposits?*
6. *What is topography?*
7. *What are the two main types of hills in Ohio?*
8. *Name the three kinds of bedrock in Ohio.*
9. *What kind of rock are they?*
10. *How were they formed?*
11. *Which kind of these three sedimentary rocks in Ohio is "softer"?*
12. *What effect did the "softer" rock have on glaciation in Ohio?*
13. *Which type of rock is more impermeable to water?*
14. *Which type of bedrock can be seen at Mohican School? Where?*
15. *How old, in the geologic timetable are the sandstone bedrock hills?*
16. *How old are the hills which were deposited here by the glacier?*



ADAPTED FROM GLACIAL MAP OF OHIO,
U.S. GEOL. SURVEY MISC. GEOL. INV. MAP I-516

GLACIAL DEPOSITS OF OHIO

0019


BM
1026
MOHICAN
OUTDOOR SCHOOL
SCALE
0 330 660 990 1320 1650 1980
FEET
N
W
E
S
Pleasant Hill Lake
Lake Lab. Dock
1100
1200
1067
Richland-County
Ashland County
WOOSTER PRESBYTERY
OUT-DOOR CENTER
1058
Lake Trubee
Lake House
Rose House Barn
FORBES RD
McCURDY ROAD
Nature Trail
1200
Outpost Camp
1300
Fire Road
Nature Trail
Dam
BM985
Kettle Hole
Camp Manager
GOON ROAD
1020

JOURNAL PAGE

MONDAY, _____

TUESDAY, _____

WEDNESDAY, _____

0021

THURSDAY, _____

FRIDAY, _____

Grace before meals is a personal thing. We at the outdoor school believe that those who want to join in a unison type grace can, and those who do not, need not. Sometimes we will have a silent grace for those who want to do it in a special way. No matter what our personal feelings are - we at the outdoor school are thankful that we have food, shelter and a good life. Because we are so fortunate - we give thanks. Be thankful to whom you please; in any way you please; when you please - but be thankful.

The Board is Spread

(Morning, Noontime, or Evening) is here,
The board is spread.
Thanks be to God
Who gives us bread. Amen

Thanks

Thank you for the world so sweet;
Thank you for the food we eat;
Thank you for the birds that sing;
Thank you, God, for everything.

Johnny Appleseed

Oh, the Lord is good to me
And so I thank the Lord
For giving me the things I need,
The sun and the rain and the appleseed.
The Lord is good to me.

Hark

Hark to the chimes
Come bow your head.
We thank you Lord
For this good bread. Amen

Our Bread

Back of the bread is the flour,
And back of the flour is the mill,
And back of the mill is the wind and the rain
And the Father's will.

Say Thanks

For the loveliness that surrounds us
For the health that is in us
For the shelters that protect us
Let us be forever thankful. Amen

0024

SKETCH IDEAS

The following poetry was written by former students who have won the annual poetry writing contest.

THE WHITE VIOLET

There was a certain graveyard, in a certain place,
That had a certain violet all over its face.

Its color was blue, its size was small,
But as it grew, its pride grew tall.

But along the path that led to the gate,
There was a violet that had no mate.

Its color was white, its size was small,
But I don't think it grew very tall.

When the flower died from someone's step,
The other violets tried to cover the spot it left.

Sheila Kaufman, 7th Grade
Wooster Heights, 1961
Madison District

(Published in 1962 Spring Issue of The Posey Book)

THIS LAND

It thrills me when I walk
this land,
To think that men of old,
Have trod this place to
make for me
A better life and home.

There were the Hershes and
the Kellers,
The Maglotts and the Kellers;
Who all have helped to build
the way,
For a strong and free America
For us who live today.

Linda Miller, 7th Grade
Madison Jr. High, 1963
Madison District

NEAR A CREEK

In a creek, small animals are
found
Snakes and salamanders are all
around,
Birds and squirrels are found
nearby
In the trees or in the sky.

Shelves of rock are here to see,
Most are larger than you or me.
I could sit by a creek all day.
Letting it go its own way.

Larry Long, 7th Grade
Madison Jr. High, 1965
Madison District

THE BIG PINE

The pine tree stands bearing its cones,
And Mary lies under the tree,
Her marker turned with age.
Violets grow wild, the air smells of pine,
But yet, there is something so close and near.
It might be the wind whipping through the trees
Or a stream running clear.
Yet, the sweetest thing of all to hear
Is nature whispering in your ear.

Dennis Wilt, 7th Grade
Wooster Heights 1962
Madison District

THE OLD CHURCH

There was a church that stood so bright,
But died away on the clearest night.
With all the fight and all the might
To keep the church so white and bright,
With just one sparkle it was gone.
It is never to be seen again.

Yet, the tree that stood so bright
Is standing still to the best of sight.
The markers are there still,
And the beauty of time is passing away.

Sandra Williams, 6th Grade
Wooster Heights, 1964
Madison District

DON'T BE A LITTER BUG

I walked along the other day
Watching just the moon,
I walked along the other day
Saw a picnic paper spoon.

As I walked along the other day,
I saw a Solomon's Seal.
As I walked along the other day,
I saw a stray orange peel.

Much and many papers I found;
What a sight looks the ground!
It's such a pity when you see
Litter bugs - like you and me.

Judy Fort, 6th Grade
Woodville, 1966
Madison District

THE PINE

For a hundred or more years the pine tree has stood,
Older than most of the trees in the wood,
Guarding the gravestones as time marches by,
The pine tree has stood, higher than high.
Oh, the things the pine tree has seen -
Weddings and funerals and things that have been.
Oh, the things the pine tree has heard -
Laughter and crying and the chirp of a bird.
For a hundred or more years the pine tree has stood,
It will continue to guard the graves in the woods.

Kitty Vidra, 6th Grade
Bedford Elementary, 1966-67
Springfield Township

(Published in the 1969 February issue of Ohio Woodlands)

MY TRIP TO THE OUTDOOR SCHOOL

For those of you who have not been
Come along and follow,
Let me take you on a trip
To the School at Hidden Hollow.

Of all the things I did that week
Some I shall remember,
Like Misery Hill and nature walks
In the scenic forest timber.

Misty mornings, crisp and cool,
Flag raising on the hill,
Hearts beating fast, heads held high
While everyone is still.

There was the old graveyard
And a pine tree straight and tall,
It reminded me of pioneers
The bravest men of all.

There is the abandoned farm house
That now stands all alone,
It once was filled with laughter
And someone called it home.

The actual trip is carefully planned
For an educational reason,
And it has proved to be worth while
At any time or season.

Phillip Edwards, 6th Grade
Stingel Elementary, 1967-68
Springfield Township

MEMORIES

Have you ever walked through the woods at night,
and rustled the leaves that scared the birds into flight?

Have you ever seen the raising of Old Glory,
Or at night have your counselors tell you a bedtime story?

Have you ever been in an old cemetery,
And read the dates while you tarried?

Have you ever visited an old abandoned farm,
Or slid down the hay chute in the old barn?

Have you ever been out to feed the old goat,
Or have pond ecology in a glass bottom boat?

Have you ever rolled down old Misery Hill,
Or wished at night things weren't so still?

Have you ever talked about water conservation,
A problem that is spreading across the nation?

Have you ever made a casting on sand,
And decorated it so it looked just grand?

Have you ever made a great new friend,
Or have your very own job to attend?

All of these things I shall remember,
Of my trip to the Mohican School in November.

Gina Gibney, 6th grade
Stingel Elementary, 1968-69
Springfield Local

HAVE YOU?

Have you ever sat down on a fallen tree
And watched the water roll by?

Have you ever laid down on a bed of leaves
Have you ever looked around and said:
"I wonder why!?

Fish swim, trees grow, birds fly?"

Leslie Seward, 6th grade
New Haven, 1969-70
Willard City

OUTDOOR CAMP

Did you ever notice the deep blue sky
Or the rustle of the trees,
Children's laughter
Or the wind and the breeze
The calmness of the lake
Or the snake
The bees
The stillness of camp?
If people would only look and see--

Tammie Oborn, 6th grade
Renschville Elementary
Galion City 1970-71

I WISH THAT I COULD LIVE OUTDOORS

I wish that I could live outdoors
And see it every minute.
To see the grass and trees grow,
The spider's web as she'd spin it.

Trees like maple, beech and oak
What a wonderful sight!
The sun comes up at early dawn,
And the stars twinkle in the night.

Animals like deer and fox
Giving birth to their young.
And like the owl's cry, I'd hear,
The song of the wild as it is sung.

Lorrie Zigman, 6th grade
Central Elementary, 1971-72
Willard City

MOHICAN'S OUTDOORS

At Mohican in the spring,
Beauty touches everything.

As you turn and take a look,
You can see a little brook.

As you turn and look again,
In a birdhouse is a wren.

And maybe you'll hear a blackbird's cry,
And later you'll see it fly right by.

And going past the pond along the road,
Maybe you'll see a frog or a toad.

There's no pollution in this air,
Just nature's beauty everywhere.

Rene Leger, 6th grade
O. H. Somers Elementary
Mogadore, 1972-73

ANOTHER STUDENT POEM

Although not a winner in the annual contest, the following poem was published in the summer student issue of the Ohio Woodlands. (1969)

THE FROG

I was walking by the creek one day,
In the bright, sunny month of May
When, there before my eye
There, I saw it lie
A warty, bumpy, olive green frog!

I'd never seen such a repulsive frog
There he was, just a sittin' on that
old old log.
He looked right at me
And then jumped upon my knee
Guess what I did, I screamed!

But after I got a good look,
Gosh, he resembled the frog in my
science book.
He had a big mouth and bulging eyes,
And a long quick tongue for catching
flies.
He was a cute little fellow in a
gruesome sorta' way

So, if you ever come across a frog
Sittin' on an old, oak log,
If he locks at you like he did at me
Then jumps right upon your knee
All I can say is DON'T scream.
"Here is Outdoor Education".

Ann Hellinger, 6th grade
Bedford - Springfield
1966-67

Other poems to think about:

I MUST NOT HURRY

I must not hurry along this road,
There is so much to see;
A crimson flower, a wrinkled toad,
A knotty, scarred oak tree.

A bubbling brook, a lacy fern,
A cobweb shimmering still;
A yellow bird whose mournful notes
Sound over vale and hill.

Because all nature's loveliness
is very dear to me,
I must not hurry along this road,
There's just too much to see.

Betty Jean Soule

BUT
(A Lesson in Ecology)

This is a plant
So new and small
That it hardly shows
In the moonlight at all -
But
This is a rabbit
Hopping, hopping,
He smells the plant,
And now he's stopping -
but
There sits an owl
With great big eyes
He sees the rabbit
And silently flies -
but
Here comes a fox
Not missing a sound
He gets ready to pounce
When the owl strikes the ground -
but
Here comes the farmer
Looking things over
He gives a whistle
To his big dog Rover -
So
The fox slinks away
The big owl goes -
The rabbit hops home
The plant just grow -

May Watts
(Authoress -
Reading the Landscape)

0028

TRAILSIDE FACTS AND MANNERS

It is very important that teachers go over this section with the students before coming to Mohican School.

Once Ohio was a wilderness of large forests and meadows full of wildflowers, wildlife, and cut through by streams of clean flowing water. But today this has changed. As man increased in numbers the natural resources decreased. Conservation-minded people have been trying to hold back the wasteful destruction of our natural resources for many years. You are enjoying some of these resources this week at the outdoor school. Do everything you can in the future to see that good conservation is practiced in the community where you live. As a voter make sure you vote for good conservation. Begin right now to learn what conservation means and study these pages of trailside facts and manners. Conservation starts with little practices as well as big ones. Learn and practice the following:

Plants

Many students will follow you to the outdoor school,and we ask that *no wildflowers be picked* unless by permission of your teacher. Let the students who come after you find the flowers undisturbed. Some wildflower plants do not survive if the flower is picked. The following is a list of plants that should never be disturbed: club mosses, trillium, lady's tresses, flowering dogwood, wild lilies, shooting star, bloodroot, bluebells, anemones, dutchman's breeches, jack-in-the-pulpit, and ground cedar.

It is against the law to pick any plants on public lands, state forests, parks of all kinds, and wildlife areas. On land owned by private individuals the plants are under the control of the owner and should not be disturbed without permission. If and when you do pick wildflowers, do it sparingly. If there are not more than 20 flowers of the species you want - do not pick.

Trees should never be damaged. Do not carve on trees with a knife or split or break small branches. When a tree is damaged it is more subject to disease. Be careful not to step on small trees when in the woods. Remember your friends by not letting a branch snap back into their faces.

Wildlife

Song birds are those which are not valuable as game species. These birds are protected by law. It is possible for people to destroy the habitat where birds live and thus destroy the birds. Little is done to help this group of birds. You can do your share, however, by feeding these birds in the winter. They suffer losses to enemies, severe cold, starvation and other causes each year, but they increase during the breeding season and their population remains about the same unless men cut down the forests, drain swamps or in other ways destroy their habitats. When this happens they may disappear forever. Mohican School is a Federal Bird Banding Station. Students are not to touch the traps at any time without adult supervision. Bird banding helps us learn more about each species. You will get your chance to help in this learning situation.

Game birds are those which are prized as food or for the sporty shooting they provide. This group of birds may be hunted during certain seasons to provide outdoor recreation for large numbers of people. In other words, the surplus of game birds is harvested with a gun much like farmers harvest their crops. Most game birds lay many eggs and produce big families while song birds have small families. The game birds have a larger surplus each year. Game birds are not to be harmed except during hunting season and according to the laws governing hunting.

Hawks and owls are not game birds. They both do man much more good by killing mice and other rodents than they do harm. They are protected by the law except where there is proof that they are harming a farmer's property.

Fish are no longer protected in Ohio by closed seasons. It has been proven that in many areas fish are more plentiful than their food supply. Therefore, people may fish the year around as recreation. But remember fish have a habitat just like all other wildlife. Do not pollute the lakes and streams. Little things thrown into the water can do much damage. We need clean water - never dump or throw anything into lakes, streams or ponds.

The wildlife at Mohican drink from the ponds, creeks and big lake, but no students are to follow their example. Consider all Ohio outdoor water unfit for human consumption.

Frogs may not be hunted during their spawning season. Turtles may be hunted all year round. Snakes are not protected by law, but they are very beneficial to man by destroying agricultural pests and should not be harmed. There are two types of poisonous snakes in Ohio. They are rattlesnakes and copperheads, but they are very few in number in our part of the state. It is best to leave snakes alone except when your teacher has identified the reptile as nonpoisonous.

Wild Animal Pets

Rarely do wild animals abandon their young as orphans. Every year, however, people find animals in the woods and bring them home to be raised as pets. The mother of the animal was probably close by watching as her babies were taken from her. Many of these young animals die after being brought home due to the fact that the people do not know what or how to feed them. If they do survive and are returned to the wild they have lost valuable lessons that would have been taught them by their parents and they usually die of starvation. They are unpredictable if they are kept as pets very long and many times they get mean and harm a member of the human family. If you do find a young animal near a dead parent call the county game protector to come and get it. It is best not to touch the animal unless you are very careful.

There is a stiff fine for those people caught keeping wildlife illegally. There are legal ways to keep wildlife, but you should contact the county game protector if you are interested. The outdoor school keeps some animals in cages for you to see. Most animals we catch are set free. We have federal and state permits for trapping and keeping wildlife. No animals may be taken home from the Mohican School by students.

Never tease any animals kept in captivity. Do not feed any animals at Mohican without the supervision of a Mohican Staff member.

Rabies

Rabies is a very serious disease that warm blooded animals contact from each other. Humans are warm blooded animals. The disease is spread by the sick animal's saliva. Never handle a wild animal because of the danger of being bitten. All animal bites must be reported to the local county health department. The health department officials will advise bitten people as to what must be done. Rabies is fatal once the incubation period is over. Humans bitten by rabid animals can be saved by taking anti-rabies shots. Never tease or touch strange animals.

Poison Ivy

Poison ivy is a problem to many people. Some people are more immune than others. It is believed that a person's immunity gets weaker during each exposure. The plant sometimes grows like a vine and sometimes it looks like a bush. The leaves are made up of three leaflets. When contact is made many people break out in a rash. When people think that they have been near poison ivy they should wash well with a strong soap. After removing their clothes they should wash their hands again. Most people contact the rash as a result of touching their clothes after the clothes have touched the plant. At Mohican School strong brown soap is in every rest room during the fall and spring.

Litter

Remember to leave no litter behind. Get in the habit of picking up <u>everything</u> you find in the outdoors that does not belong there. Do not be a litterbug. *"Every litter bit hurts."* Remind adults to not throw trash out of car windows etc. Keep our outdoors beautiful!

Compiled with the help of Ohio
Department of Natural Resources

* * * * * * * * * * * * * * * * * *

GREEN RIVER

When breezes are soft and skies are fair,
I steal an hour from study and care,
And hie me away to the woodland scene,
Where wanders the stream with waters of green. . .

William Cullen Bryant

SOMETHING TOLD THE WILD GEESE

Something told the wild geese
  It was time to go.
Though the fields lay golden
  Something whispered, "Snow".
Leaves were green and stirring,
  Berries, luster-glossed,
But beneath warm feathers
  Something cautioned, "Frost".
All the sagging orchard
  Steamed with amber spice,
But each wild breast stiffened
  At remembered ice.
Something told the wild geese
  It was time to fly--
Summer sun was on their wings,
  Winter in their cry.

--Rachel Field

POND, CREEK & LAKE

The kinds of organisms found in an aquatic habitat such as a pond or creek depends greatly on the non-living characteristics of the water itself. These characteristics are such things as length, width, depth, dissolved oxygen, water speed, water temperature, and acidity.

Water Temperature has an important effect on all aquatic organisms. Most organisms which live in water have no way of controlling their body temperature. This means that the body temperature of most aquatic organisms is the same as the temperature of the water.

The temperature of the water also determines the amount of gases that can be dissolved in water. Many of these gases, such as oxygen, are essential for life.

Dissolved Oxygen is oxygen that is actually dissolved in the pond or creek water. It is the one non-living characteristic which is essential to nearly all organisms.

In ponds, the oxygen is produced in the water by green plants. In the process of photosynthesis, green plants absorb carbon dioxide and in the presence of sunlight produce starch and oxygen. Because sunlight is necessary for plants to make oxygen, the amount of oxygen in the water varies over a day. It usually reaches its lowest concentration just before sunrise and its highest concentration just before sundown.

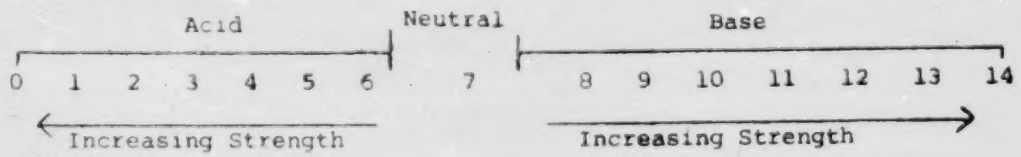
In creeks, most oxygen is not produced by plants. The reason is that few plants can actually grow in creeks and streams due to the current. Therefore, oxygen can be dissolved in this water only by mixing with the air. Remember that "air" is approximately 20% oxygen.

The unit that is used to measure dissolved oxygen is ppm (parts per million). Suppose the oxygen concentration in water is found to be 6 ppm. This means that if 1,000,000 drops of water were removed, only six would be pure oxygen.

Water Speed affects creek-dwelling organisms more than pond-dwellers. Ecologists refer to this as the velocity. Velocity is a measure of speed and therefore it is measured in distance per unit of time. Automobile speed is measured in miles (unit of distance) per hour (unit of time). Stream speed is usually measured in feet per second.

To measure water speed you will need a float such as a fishing "bobber" and a watch with a second hand. You must first step off a known distance along a stream bank. Next you time how long it takes a floating object to travel the distance. This allows you to measure the speed in feet per second.

There are a large number of chemical compounds which can be classified as either acids or bases. Chemists use a scale, known as the pH scale to measure the acid or base properties of water. The pH scale measures from 0 to 14. A solution with a pH less than 7 is an acid; and a pH greater than 7 is considered a base. A pH of exactly 7 is considered neutral (neither an acid nor a base).



As the pH value of a solution drops from 7 to 0, the strength of the acid increases. For example, a solution with a pH of 3 is a stronger acid than a solution with a pH of 4.

As the pH of a solution rises above 7, the strength of a base increases. For example, a solution with a pH of 9 is a weaker base than a solution with a pH of 10.

The pH of a pond or stream is determined by a large number of possible factors such as (1) the type of rock material exposed beneath the water surface (2) amount of CO_2 dissolved in the water (3) runoff from agricultural lands (4) industrial pollutants.

In general, streams which flow over limestone have a pH greater than 7. In waters which flow through mining areas, the pH is usually far below 7. The pH may also be below 7 in small ponds which are grown over with plants.

The following two pages are for you to keep data on the living and non-living factors you discover in pond and stream.

Name _____

POND STUDY

Non-living Things:

Date	Time	Water Temperature	Air Temperature	pH	Oxygen	Weather

Living Things:

Birds

Species	Where found?

Amphibians

Species	Where found?

Reptiles

Species	Where found?

Fish

Species	Length

Plankton

Species	Species

Other Invertebrates

Species	Where found?

Insects

Species	Where found?	Developmental Stage (egg,larva,pupa,adult)

00034

Date_____ Name_____

Tribe_____

CREEKBED STUDY

Physical-Chemical Data:

Station 1 _____ pH _____

Time _____ Oxygen _____ppm

Air Temperature _____ Water Speed _____ft./sec.

Water Temperature _____ Water Color _____

* *

Station 2 _____ pH _____

Time _____ Oxygen _____ppm

Air Temperature _____ Water Speed _____ft./sec.

Water Temperature _____ Water Color _____

* *

Station 3 _____ pH _____

Time _____ Oxygen _____ppm

Air Temperature _____ Water Speed _____ft./sec.

Water Temperature _____ Water Color _____

List below the organisms seen in each area.

Run Riffle Pool

00035

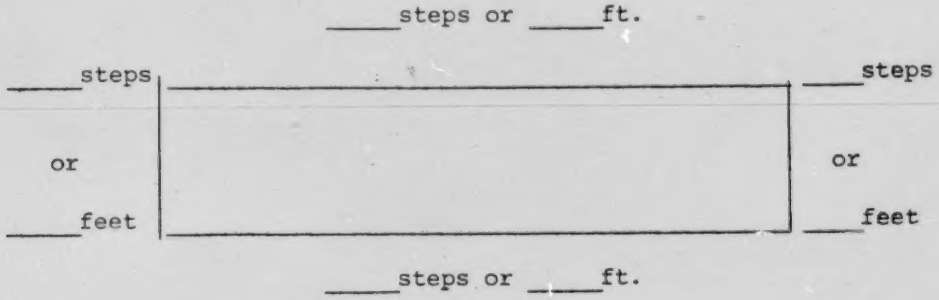
MATH HIKE

Finding the area of a field:

1. You must first find the average length of your step. It is

   _____feet.

2. Record on the drawing below the length of each side of the field.



3. Find the area of the field in square feet.

   Area = average length X average width
   Area = _____feet X _____feet
   Area = _____square feet

4. If there are 43,280 square feet in an acre, how many acres are there in this plot?

$$\frac{\text{_____ sq. ft.}}{43{,}280 \text{ sq. ft.}} = \text{_____ acres}$$

Outdoor Estimations

1. What is the height of the porch of the lodge?

   _____. Height of the top of the lodge?_____.

2. What is the length of the lodge?_____.

3. How far away are several distant landmarks?

   a. _____ b. _____ c. _____

4. Tree estimations.

	Tree No. 1	Tree No. 2	Tree No. 3
a. Height	_____	_____	_____
b. Diameter	_____	_____	_____
c. Age	_____	_____	_____
d. Kind	_____	_____	_____

0036

COMPASS GAME

The compass game consists of tags that are found in various locations in the dining room area. The tags are numbered and the information on one tag will help you find the next. Eventually, you will reach the last tag of the game. It will tell you when you have completed the game.

One piece of information given is how far away the next tag will be. This distance is given in feet. To be able to estimate the distance each student must know his length of step.

The following formula is used to find length of step. Do not use remainders. We are interested only in whole numbers.

_____ steps in 100 feet

_____ steps in 100 feet

_____ steps in 100 feet

_____ Total Steps

_____ Average = $3 \overline{)\text{Total Steps}}$ Average

_____ Length of Step = Average $\overline{)100}$ Length of Step

The next piece of information is a compass heading in degrees. This compass heading will show you the direction of travel to your next tag.

You will be given a compass. Note the string around the compass - please put it around your neck. The teacher will show you how to read the compass. You will then be sent out to start the game. At the completion of the game, hand in your compass.

TURTLES - TORTOISES

Located on the table before you is the equipment needed to answer some of the following questions. It is possible you may need to share equipment with others so be sure you are familiar with all equipment before you start. The best answers will depend on your common sense not necessarily your intellectual ability.

Name_____ Date_____ School_____

Turtles

Beware-they may bite! You will not be harmed, but your skin can be broken.

List and describe the differences:

		Turtle A	Turtle B
(1)	Size - length		
(2)	Size - width		
(3)	Color of ear area		
(4)	Color of upper shell (carapace)		
(5)	Color of under shell (plastron)		
(6)	Color of eyes		
(7)	Length of tail		
(8)	Long or short toenails?		
(9)	Weight		
(10)	Name		
(11)	Describe any other differences:		

Tortoises

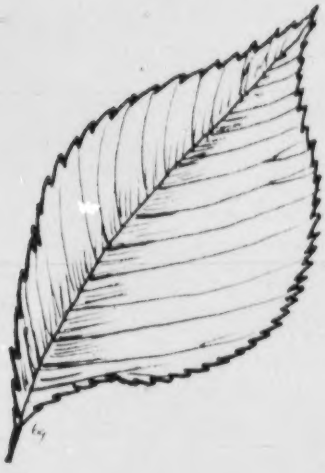
Can be handled without danger of being bitten. Always wash your hands after handling tortoises and turtles.

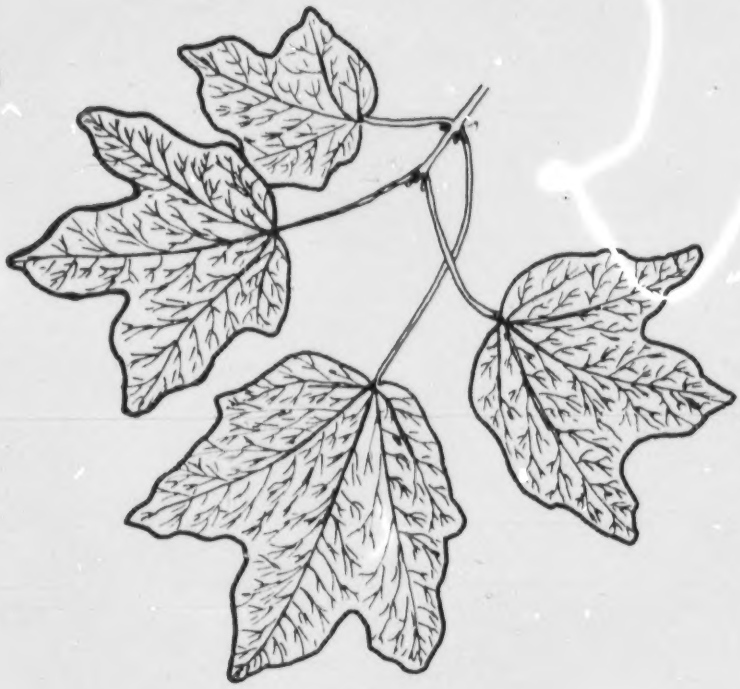
List and describe the differences:

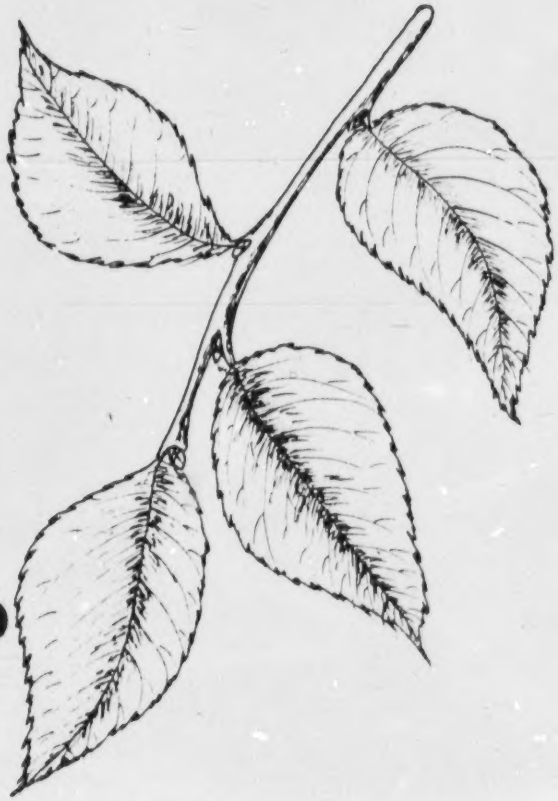
		Tortoise A	Tortoise B
(1)	Size - length		
(2)	Weight		
(3)	Size - width		
(4)	Color of eyes		
(5)	Color of upper shell (carapace)		
(6)	Color of under shell (plastron)		
(7)	Length of tail		
(8)	Long or short toenails?		
(9)	Describe how tortoise goes into shell		
(10)	Name		
(11)	Describe any other differences:		

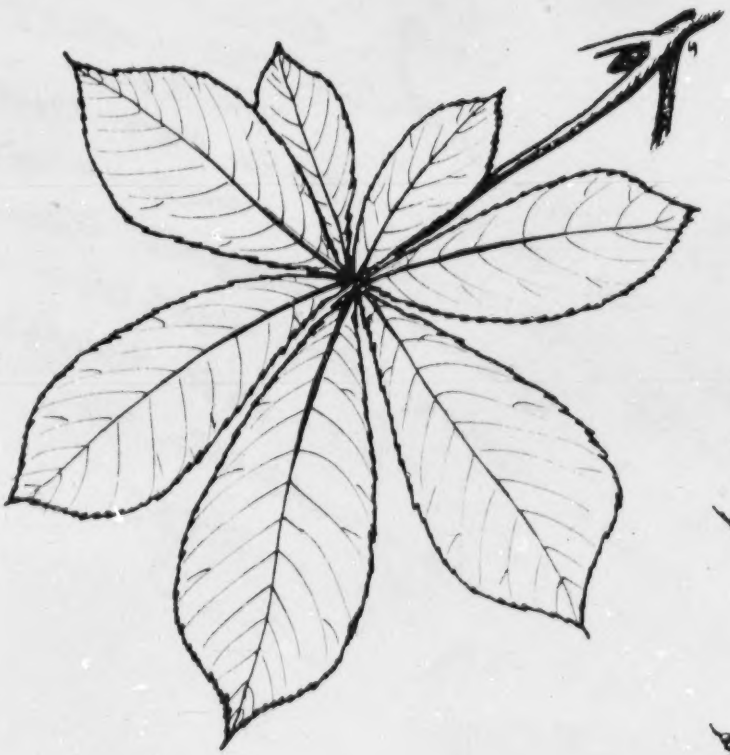
0038

TREE IDENTIFICATION VOCABULARY









This key can be used to study trees near your home or school. After you learn the vocabulary - you are ready. The numbers on the left provide you with choices. (Example: 1. - leaves opposite; 1 - leaves alternate. After you make your choice the key explains where you go to make your next choice - either 2 or 7.) By making choices from observation you will come to the name. A 10x hand lens will help.

KEY TO THE DECIDUOUS TREES-WITH LEAVES

1. Leaves opposite - 2
1. Leaves alternate - 7
2. Leaves simple - 3
2. Leaves compound - 4
3. Leaves pinnately veined, not lobed - - - - - - - - - - - - - - - Dogwood
3. Leaves like fingers, lobed - - - - - - - - - - - - - - - - - - - Maple
4. Leaves of fingerlike arranged leaflets - - - - - - - - - - - - - 5
4. Leaves of pinnately arranged leaflets - - - - - - - - - - - - - - 6
5. With five leaflets - Buckeye
5. With seven leaflets - Horsechestnut
6. Leaves of three to seven, coarsely toothed or lobed leaflets - Box Elder
6. Leaflets five to thirteen entire of only fine teeth - - - - - - Ash
7. Several buds clustered at tip of branch - - - - - - - - - - - - Oak
7. Buds not clustered at tip - - - - - - - - - - - - - - - - - - - 8
8. Leaves simple - 9
8. Leaves compound - 21
9. Leaves not lobed - 13
9. Leaves variable, some lobed, some not lobed on same tree - - - 10
10. Leaf margin entire, twigs green, aromatic - - - - - - - - - - - Sassafras
10. Leaf margin finely toothed; twigs not aromatic - - - - - - - - Mulberry
11. Leaves pinnately veined - Tulip Tree
11. Leaves palmately veined - 12
12. Leaves with three large veins at base bark peeling in thin flakes - - - - - Sycamore
13. Leaves two ranked on most branches - - - - - - - - - - - - - - 14
13. Leaves regularly more than two ranked - - - - - - - - - - - - - 17
14. Leaves with three to five large veins from base, heart shaped - - - - Linden
14. Leaves with one distinct midvein from base - - - - - - - - - - 15
15. Bark on trunk smooth, light gray, leaves serrate - - - - - - - Beech
15. Bark rough on trunk - 16
16. Leaves very oblique at base - - - - - - - - - - - - - - - - - - Elm
16. Leaves not oblique at base - - - - - - - - - - - - - - - - - - Chestnut
17. Trees with thorns - Hawthorn
17. Trees without thorns - 18
18. Leaves toothed - 19
19. Leaves about as broad as long - - - - - - - - - - - - - - - - - Poplar
19. Leaves longer than broad - - - - - - - - - - - - - - - - - - - 20
20. Buds with single scale twigs yellow green, not bitter - - - - - Willow
21. Leaflets entire - 22
21. Leaflets toothed - 23
22. Twigs with spines - Black Locust
22. Twigs with no spines - Tree of Heaven
23. Leaflets five to eleven - Hickory
23. Leaflets eleven to twenty-three - - - - - - - - - - - - - - - - Walnut

0042

HOW TO KNOW THE TREES WITHOUT LEAVES

A. BUDS OPPOSITE	
B. LARGE (over ½ inch)	BUCKEYE
B. SMALL (½ inch or less)	
C. SCALES MEETING: TWO KINDS OF BUDS PRESENT	FLOWERING DOGWOOD
C. SCALES OVERLAPPING	
D. BUDS OVAL; TERMINAL BUDS IN THREES, WITH MIDDLE BUD MUCH LONGER	MAPLE
D. BUDS FAT, DARK BROWN; TERMINAL BUDS CLUSTERED	ASH
A. BUDS ALTERNATE	
B. SAP MILKY	
1. BUDS TRIANGULAR, WITH RED-BROWN SCALES	MULBERRY
2. BUDS TINY; TWIG ARMED WITH THORNS	OSAGE ORANGE
3. PITH ORANGE; TREE SHRUBBY	SUMAC
B. SAP NOT MILKY	
C. WITH THORNS	
1. THORNS SLENDER, BRANCHED	HONEY LOCUST
2. THORNS IN PAIRS; BUDS SUNKEN	BLACK LOCUST
3. THORNS SINGLE; BUDS TINY	HAWTHORN
C. WITHOUT THORNS	
D. PITH PARTITIONED	
1. PITH LIGHT TAN; BUDS NAKED	WALNUT
2. PITH CHOCOLATE BROWN; BUDS NAKED	BUTTERNUT
3. PITH WHITE; BUDS OVAL, FLATTENED	TULIP TREE
4. PITH PARTITIONS UNEQUAL; BUDS RED-BROWN	TUPELO
D. PITH NOT PARTITIONED	
E. WITH CATKINS	
1. BARK SMOOTH OR PAPERY	BIRCH
2. BARK SHREDDED VERTICALLY	HOPHORNBEAM
3. BARK DARK, WAVY; TWO SIZES OF BUDS	HORNBEAM
E. WITHOUT CATKINS	
F. BUDS CLUSTERED AT TIP OF TWIG	OAK
F. BUDS NOT SO CLUSTERED	
G. WITH DISTINCTIVE TWIGS	
1. TWIGS GREEN, SPICY	SASSAFRAS
2. TWIGS SMOOTH, DARK, BITTER	CHERRY
G. WITHOUT DISTINCTIVE TWIGS	
H. BUDS NAKED; BRIGHT YELLOW	BITTERNUT HICKORY
H. ONE BUD SCALE SHOWING	
1. END BUD LARGE, WOOLLY	CUCUMBER
2. BUD CONICAL, FROM LEAF SCAR	SYCAMORE
3. BUDS REDDISH, APPRESSED	WILLOW
H. TWO BUD SCALES SHOWING	
1. TINY, ROUND BUDS; LARGE LEAF SCAR	AILANTHUS
2. ONE SCALE BULGING, LOPSIDED	BASSWOOD
3. END BUD FAT; SCALES SOFT	PIGNUT HICKORY
H. THREE SCALES SHOWING; BUDS SMOOTH, OVAL; PITH STAR-SHAPED	CHESTNUT
H. MORE THAN THREE SCALES SHOWING	
1. INNER SCALES SOFT GRAY; OUTER WITH LONG POINTS	SHAGBARK HICKORY
2. BUDS BROWN, LONG, SLENDER, SHARP	BEECH
3. SCALES IN TWO VERTICAL ROWS; BUDS TIPPED ASIDE	ELM
4. LONG, SHARP, VARNISHED BUDS	POPLAR

0043

TREE OBSERVATION

"The woods are lovely, dark and deep . ."
Robert Frost

			Bark
			Buds
			Leaf Scars
			Leaves
			Outstanding Characteristics
			Name

0044

FERNS

Ferns are flowerless plants which grow from a root or rootstock. The rootstocks are underground. The leaves are called fronds. Ferns produce spores instead of seeds. The spores are in spore cases or sporangia and are usually arranged in dotted lines on the back or margins of the fronds. Ferns reproduce by dropping the spores and by new buds developing from the rootstocks.

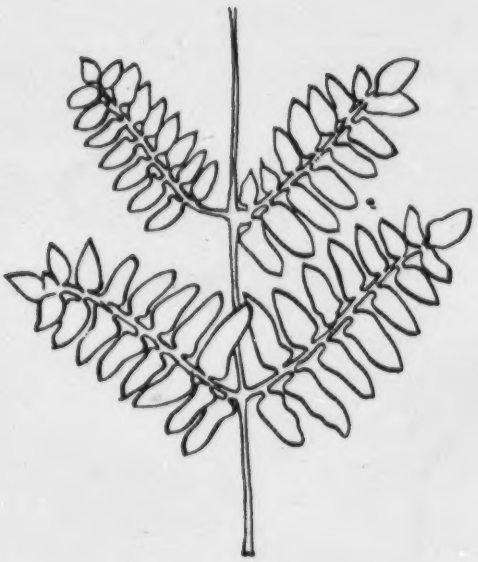
A frond is simple when it consists of an undivided leaf. We could say the frond is uncut.

Some fronds are once cut or once pinnate. A once cut frond is pinnatifid when it forms lobes which are cut half-way or more to the midvein.

0045

Some once cut or once pinnate fronds are cut clear to the midvein. The little leaflets are called pinnae (plural) or pinna (singular).

Some fronds are twice cut (twice pinnate) when the pinnae are cut into sub divisions which have their own midveins. These pinnae are divided into smaller leaflets called pinnules.



Some fronds produce spores and are called fertile - others do not and are called sterile. We will find in our study of ecology that ferns are very important in many plant communities.

0046

FERN OBSERVATION

Fertile Fronds	Circle	Sterile Fronds	Circle	Habitat-Notes	Name
	simple once-cut twice-cut		simple once-cut twice-cut		
	simple once-cut twice-cut		simple once-cut twice-cut		
	simple once-cut twice-cut		simple once-cut twice-cut		
	simple once-cut twice-cut		simple once-cut twice-cut		

WILD FLOWER

1. STIGMA } PISTIL
2. STYLE
3. OVARY
4. ANTHER } STAMEN
5. FILAMENT
6. PETALS (COLOLLA)
7. SEPALS (CALYX)
8. OVULE
9. RECEPTACLE
10. PEDUNCLE

EXPLANATION OF TERMS

The pistil is the seed bearing organ of the flower. It consists of STIGMA (1), STYLE (2), and OVARY (3).

The stigma is usually the tip of the style. The pollen grains which are deposited upon its moist roughened surface throw out minute tubes which penetrate to the little ovules of the ovary and cause them to ripen into seeds.

The style is the slender stalk above the ovary.

The ovary is the hollow portion at the base of the pistil. It contains the ovules or rudimentary seeds which are quickened into life by the pollen.

The stamens are the fertilizing organs of the flower. A stamen usually consists of its ANTHER (4), the little sac at the lip of the filament which produces the dust-like fertilizing substance called POLLEN; and its FILAMENT (5), or stalk.

The inner flower-cup of the inner set of parts is the corolla.

When the corolla is divided into separate parts, these parts are called PETALS (6).

The greener outer flower cup, which we notice at the base of many flowers is the CALYX. When the calyx is divided into separate parts, these parts are called SEPALS (7).

WILDFLOWER OBSERVATION

"I will be the gladdest thing
Under the sun!
I will touch the hundred flowers
And not pick one."
Edna St. Vincent Millay

Name			
Ecology and Habitat			
Unusual Characteristics			
Flowers			
Leaves			

0049

BIRD OBSERVATION

Size should be one of the first things to be noticed when bird watching. Bird watchers most often refer to three of the most common birds as examples of size. They are the sparrow, robin and crow.

Certainly the next thing that you will notice about a bird is his color. Every species of bird is colored differently than every other species. Therefore, color is probably the most helpful method of identifying a bird. There are two things that will sometimes make it difficult to positively identify a particular bird. They are (1) birds having similar colors or color patterns; and (2) the female of a species is either duller in color or the color pattern is actually different. In each case special care should be taken when observing each bird.

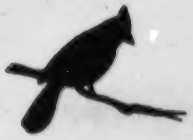
Sometimes a bird is so far off that even with binoculars his image is very small. Sometimes there is not enough light to see his colors. At these times it is helpful to know the silhouettes of some of the more common birds. Learn the silhouettes on this page, and see if they will not help.

As a person becomes more interested in bird watching he will, with more and more practice, learn to identify birds by their song.

Some birds have a flight pattern that is also of some help in identifying them. This method is especially helpful when identifying a general category of birds such as the gliding flights of the hawks.

Habitat is the particular place where any animal lives, including birds. If you think about it you will notice that certain groups of birds are most often seen along a large body of water. Others are seen on or near the ground in a woods while still others live in layers of the trees in the woods. Some live in the lower branches, some partway up the trees and others in the uppermost parts of the trees. Each group lives where it is best suited to survive.

Silhouettes by permission. Roger Tory Peterson, A Field Guide To The Birds. Houghton Mifflin Company, Boston, Mass.



CARDINAL

BLUE JAY

MOURNING DOVE

CROW

BELTED KINGFISHER

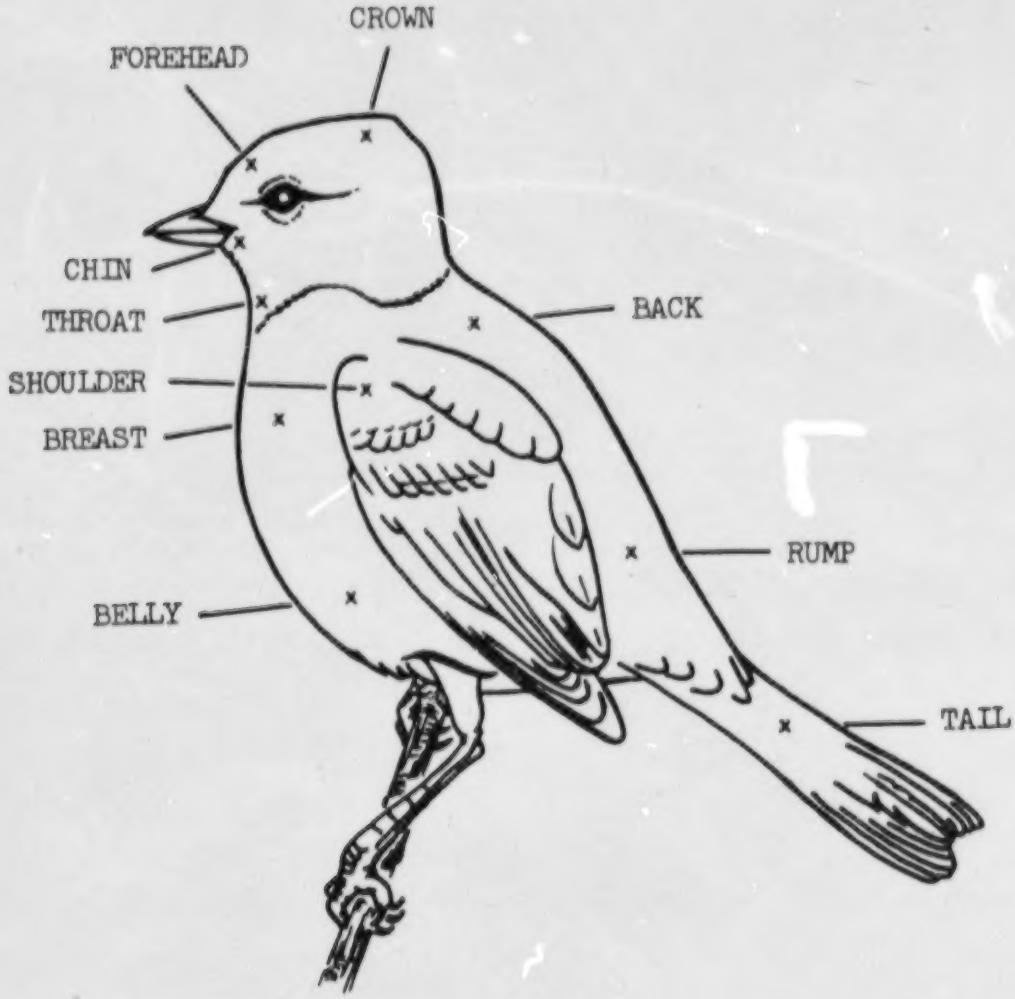
BIRD OBSERVATION

Birds are not just plain birds. There are different kinds of birds. Most of us know the difference between a robin and a cardinal, but how many other birds can we identify? There are many unusual and colorful birds in this part of Ohio. Many times the bird is not in sight long enough to get a bird identification book. Therefore, you must make some quick observations. First, check its size. Compare its size with a robin - is it larger or smaller. If he is larger or smaller than a robin, is he crow size, or sparrow size? Next, what are the predominant color or colors? And what about its shape? Quickly note any outstanding or unusual characteristics. Notice the flight pattern. Listen for the song. Then you can look it up later for identification.

SIZE	I. C.*	COLOR	SURROUNDING	SONG	FLIGHT PATTERN	NAME

*Identifying Characteristics

0051



This sketch will help you to learn some of the parts of a bird. If you will learn where they are located, it will help when you want to identify a particular bird.

The next page is designed to help you make some of the major observations that are necessary to identify birds. After you have filled in as many of the blanks as possible, you will want to use one of the simple bird identification books from our library. The best one available is Roger Tory Peterson's book A FIELD GUIDE TO THE BIRDS. Compare your observations with the pictures and descriptions in the book, then name the bird.

If you are patient and look carefully you will see that different birds are not only colored differently, they also have differently shaped feet and bills. These seemingly small differences allow them to survive in their own particular habitat. It also helps them get their own particular type of food and do it better than almost any other bird. Follow the instructions below and compare how the bird gets its food with the type of foot and bill it has.

	Draw a picture of the bird's foot.	Draw a picture of the bird's bill.	List the type of food that the bird usually eats.

PROBABLE MOHICAN BIRD LIST

BIRDS OF PREY

___BALD EAGLE
___RED TAILED HAWK
___SPARROW HAWK
___RED SHOULDERED HAWK
___TURKEY VULTURE
___SCREECH OWL
___BARRED OWL
___BARN OWL
___GREAT HORNED OWL
___OSPREY
___COOPERS HAWK
___BROAD WINGED HAWK
___MARSH HAWK
___SHARP-SHINNED HAWK

FIELD BIRDS

___HUMMING BIRD
___RING-NECK PHEASANT
___BROWN HEADED COWBIRD
___BOB WHITE QUAIL
___WOODCOCK
___E. MEADOW LARK
___SONG SPARROW
___HORNED LARK
___TREE SPARROW
___HOUSE SPARROW
___VESPER SPARROW
___CHIPPING SPARROW
___FIELD SPARROW
___YELLOW BRST. CHAT
___E. BLUEBIRD
___RED WINGED BLACKBIRD
___GRACKLE
___AM. GOLDFINCH
___REDPOLL
___BOBOLINK
___STARLING
___MOURNING DOVE
___ROBIN
___BLUE WINGED WARBLER
___PRAIRIE WARBLER
___ROCK DOVE
___YELLOW THROAT
___MOCKINGBIRD
___YELLOW THROATED

WOOD BIRDS

___CARDINAL
___EVENING GROSBEAK
___ROSE BREASTED GROSBEAK
___RUFFED GROUSE
___YELLOW SHAFTED FLICKER
___PILEATED WOODPECKER
___RED BELLIED WOODPECKER
___HAIRY WOODPECKER
___DOWNY WOODPECKER
___RED HEADED WOODPECKER
___SAPSUCKER
___BLUE JAY
___COMMON CROW
___TUFTED TITMOUSE
___BLACK CAPPED CHICKADEE
___WHITE BRST NUTHATCH
___RED BRST. NUTHATCH
___CEDAR WAXWING
___SLATE COLORED JUNCO
___FOX SPARROW
___WHITE-THR. SPARROW
___WHITE-CRN. SPARROW
___BALTIMORE ORIOLE
___ORCHARD ORIOLE
___SCARLET TANAGER
___SUMMER TANAGER
___INDIGO BUNTING
___PURPLE FINCH
___RUFOUS-SIDED TOWHEE
___E. KING BIRD
___CRESTED FLYCATCHER
___OLIVE SIDED FLYCATCHER
___E. PHOEBE
___YELLOW-BELLIED FLYCATCHER
___LEAST FLYCATCHER
___WOOD PEEWEE
___WHIP-POOR-WILL
___CAT BIRD
___CAROLINA WREN
___HOUSE WREN
___BROWN THRASHER
___HERMIT THRUSH
___LA. WATER THRUSH
___WOOD THRUSH
___OLIVE BACKED THRUSH
___GRAY-CHEEKED THRUSH
___GOLDEN CROWNED KINGLET
___RUBY-CROWNED KINGLET
___BLUE GRAY GNATCATCHER
___KENTUCKY WARBLER
___BLACK BILLED CUCKOO
___BLACK-THROATED GR. WARBLER
___VEERY
___CHESTNUT SIDED WARBLER
___BROWN CREEPER
___BLACKPOLL WARBLER
___BLACK AND WHITE WARBLER
___MYRTLE WARBLER
___YELLOW WARBLER
___PINE WARBLER
___YELLOW-THROATED WARBLER
___CERULEAN WARBLER
___RED-EYED VIREO
___PHILADELPHIA VIREO
___WHITE-EYED VIREO
___BLACKBURNIAN WARBLER
___MAGNOLIA WARBLER
___RED START
___PRAIRIE WARBLER
___PINE SISKIN

BIRDS OF THE SKY

___ROUGH WINGED SWALLOW
___TREE SWALLOW
___NIGHT HAWK
___BARN SWALLOW
___PURPLE MARTIN
___CLIFF SWALLOW
___CHIMNEY SWIFT

WATER & SHORE BIRDS

___AMERICAN BITTERN
___KING FISHER
___HERRING GULL
___BONAPART GULL
___WHISTLING SWAN
___KILLDEER
___PINTAIL DUCK
___COMMON LOON
___SPOTTED SANDPIPER
___GR. BLUE HERON
___LITTLE BLUE HERON
___GREEN HERON
___BLACK-CROWNED NIGHT HERON
___BALD PATE
___AM. COOT
___SCAUP DUCK
___BUFFLE HEAD
___WOOD DUCK
___CANADIAN GOOSE
___MALLARD DUCK
___HOODED MERGANSER
___RED-BREASTED MERGANSER
___AMERICAN MERGANSER
___AMERICAN GOLDEN-EYE
___PEKIN DUCK
___BLACK DUCK
___DOWITCHER
___AMERICAN EGRET
___SNOWY EGRET

THE IMPORTANCE OF SOIL

Land takes up only 29% of the entire surface of the earth, (and not even all of this is usable). On this amount of land man must grow the things he needs to make everything that he uses for food, clothing and shelter. All of this comes entirely from the sun and the soil. The sun gives off energy in the form of light. This energy is needed byeverything that lives and grows. The soil is necessary for two reasons: (1) it is the foothold for the plants we grow; and (2) it is the place where plant nutrients are made and stored.

SOIL PARTS

Soil is made up of four basic and fairly common parts. They are: AIR, WATER, MINERAL and ORGANIC MATERIAL

MINERALS	AIR	WATER
especially	21% OXYGEN	HYDROGEN & OXYGEN
QUARTZ	78% NITROGEN	(H_2O)
FELDSFARS	1% ARGON	

MINERAL MATERIAL

What is the most important source of mineral material? Rocks! We all know that plants can not grow on the surface of a rock. Something must happen first. The rock must be broken down into smaller and smaller pieces until the pieces are the size of a grain of sand or even smaller. This breakdown is called - WEATHERING. There are three kinds of weathering: (1) CHEMICAL, (2) MECHANICAL and (3) ORGANIC. The three most common examples in same order as above are: (1) RAIN - when falling through the atmosphere picks up CARBON DIOXIDE and forms a mild acid known as CARBONIC ACID. (2) ICE - causing pressure in cracks much like that of a wedge, and (3) EARTHWORMS - in an acre area will often pass 40 tons of material through their bodies in a one year period. (In addition to these we should include sunshine, wind, frost, heating and cooling, freezing and thawing, and wetting and drying. All of these in some way cause a weakening of the rock. Often the minerals inside the rock react with air and water. These changes within the rock then set up stresses and strains which weaken the rock even more). This process releases elements which by themselves, or in combinations called minerals, provide plant nutrients.

Of the 92 known natural elements only 8 are commonly found in rock formations. If we could weigh the earth's crust, these 8 elements would make up 98% of its weight. The element most often found is oxygen. It makes up 47% of the earth's crust. Silicon is next, making up 28% of it. (See glossary for complete list.)

ORGANIC MATERIAL

After rain has caused a weakening of the rock surfaces and freed plant nutrients, very primitive plants begin to grow there.

Among the first of these will be the LICHENS followed by MOSSES and FERNS. These are known as PIONEER PLANTS. It is these plants, as they live and die, which make possible the animal life that will soon follow them.

But after a short length of time these first plants and animals will die and other plants and animals will follow them - and die. And so the cycle continues. However, as we know the remains of these plants and animals do not just pile up.

These, too, are broken down into simpler parts which in time return to the soil, air, and water. This decay process is caused by BACTERIA, MOLDS, and FUNGI which are called DECOMPOSERS. As the decomposers work they produce HUMUS, which is the name for the dead, and decaying plant and animal material, and organic wastes, needed to make soil.

SOIL PROFILE

Of the five layers shown on the soil profile sketch only three are really soil. They are: SURFACE SOIL more often called TOPSOIL, SUBSOIL, and SOIL PARENT MATERIAL. (Both HUMUS and BEDROCK lack one of the four necessary parts of true soil. Also, bedrock is solid and unweathered.)

Soil depth around the world averages between five and eight feet. Topsoil depth averages between six and eight inches. The time needed to form one inch of topsoil probably averages about 500 years!

* * * * * * * * * * * * * *

SOME THOUGHTS ON ECOLOGY

The old log in the woods will never be a great tree again . . . things never go back . . . yet, lying there . . . covered with moss . . . it is creating new life . . . which in turn will be great and beautiful . . .

The fish eats the insect . . . the bird the fish . . . the mammal the bird and . . . the insect the mammal . . . as each, in a universal rhythm is creating new life . . . . . for there is no life except life which comes from life . . . . . .

Waters flow where daisies grew . . . .

Trees grow where swans once swam . . . . .

All things upon this earth are developing into new things . . . . . from what is here must come what is to be . . . . . there is no other material. . . .

This is the fulfillment of the promise of life . . .

. . . . nothing can be destroyed . . . .

Everything is being created . . . . .

--Gwen Frostic

* * * * * * * * * * * * * *

Before these fields were shorn and tilled

Full to the brim our rivers flowed;

The melody of waters filled

The fresh and boundless wood;

And torrents dashed and rivulets played,

And fountains sprouted in the shade.

--Bryant

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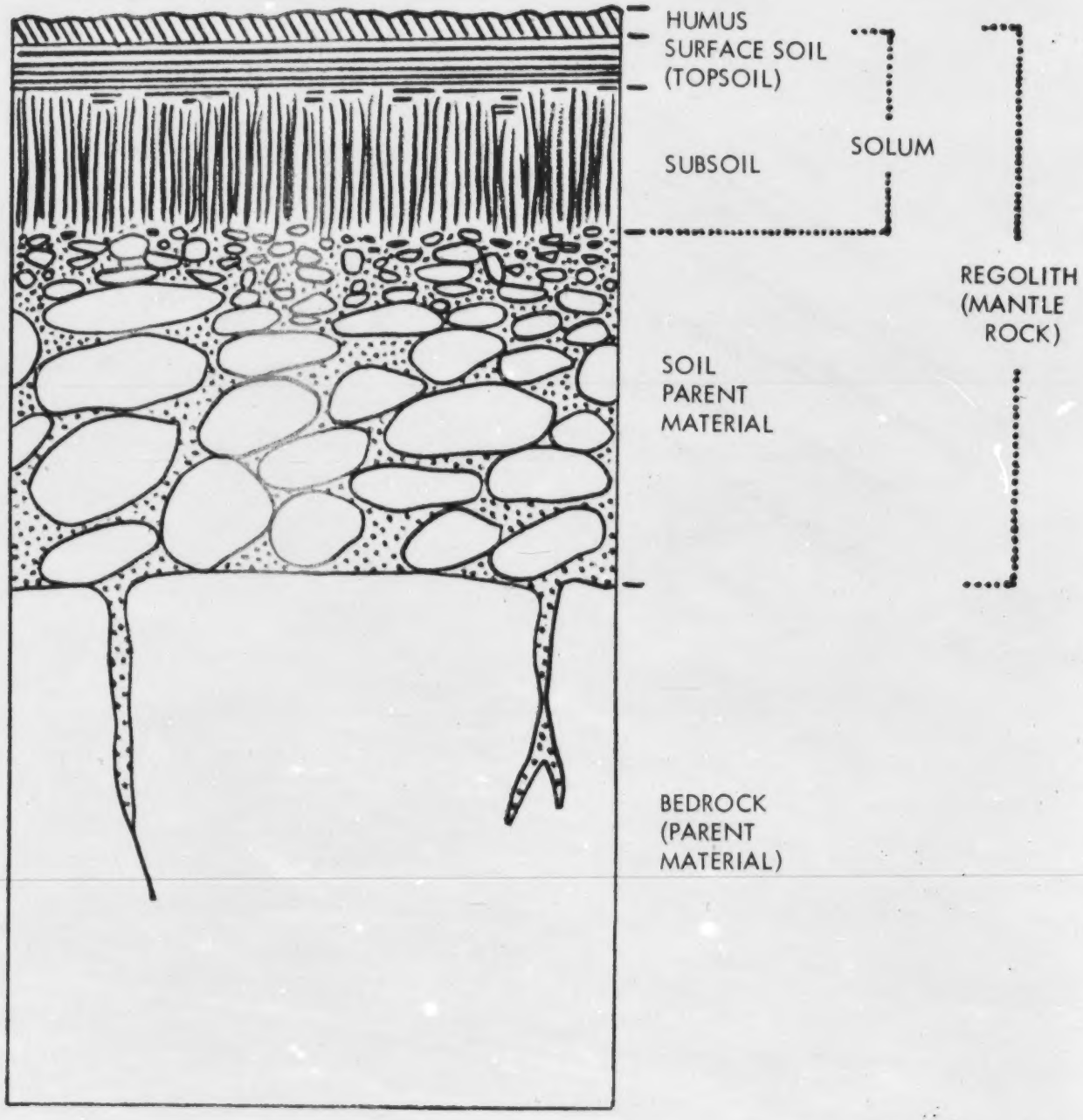
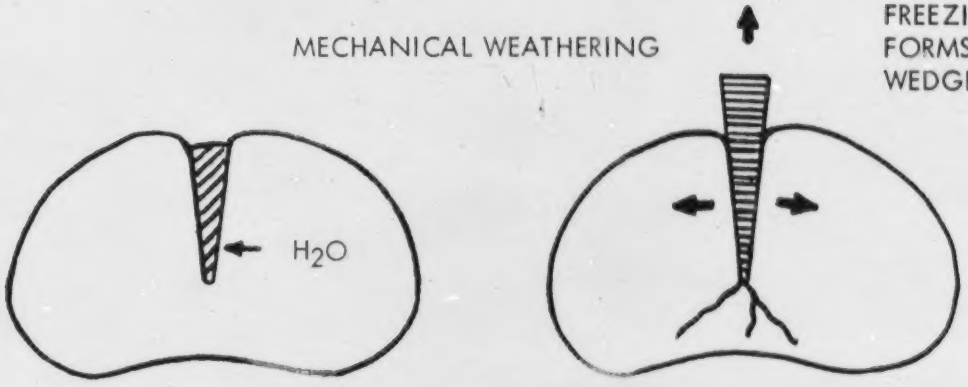
SOIL PROFILE



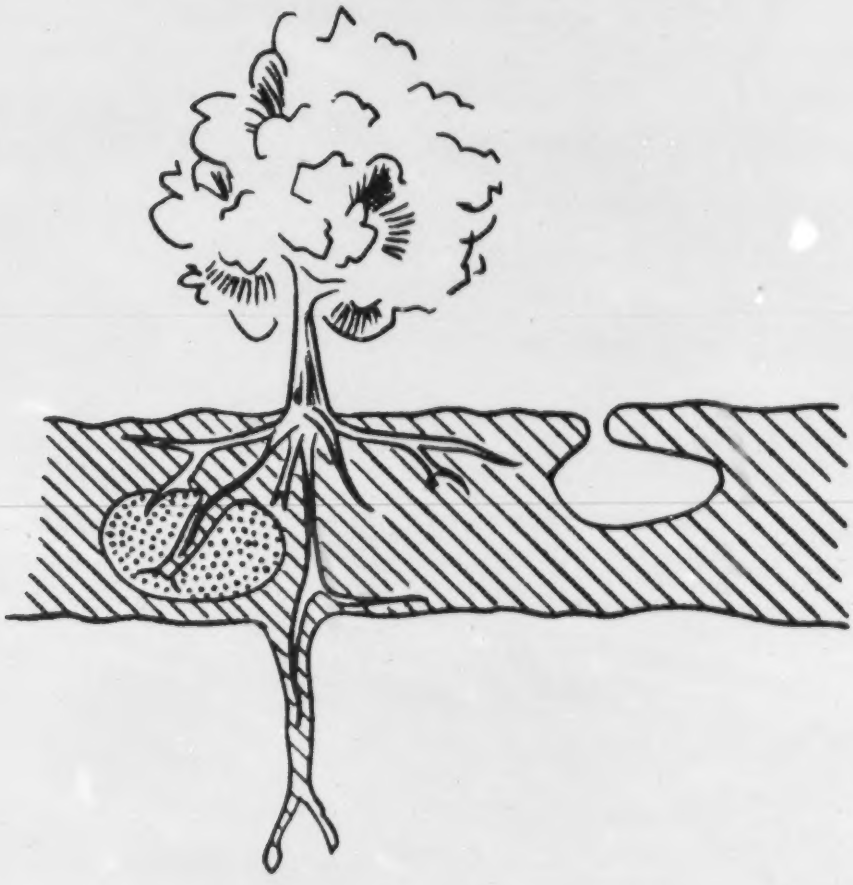
MECHANICAL WEATHERING

WATER BELOW FREEZING FORMS ICE WEDGE

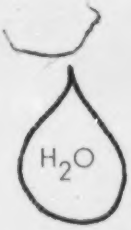


MECHANICAL WEATHERING ALSO INCLUDES DIFFERENTIAL HEATING AND COOLING.

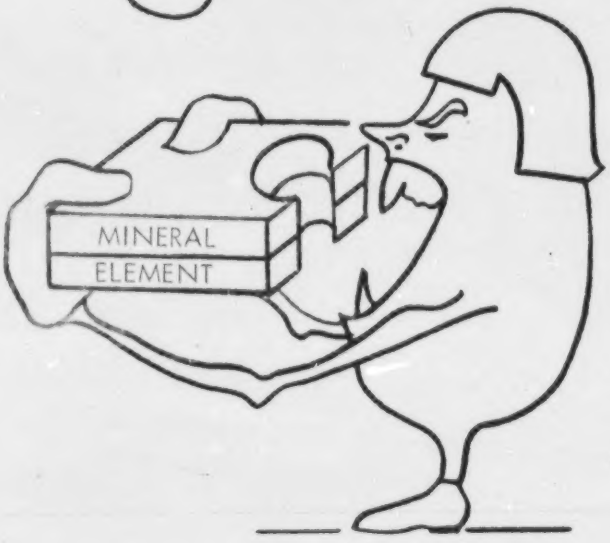
ORGANIC WEATHERING



AIR CONTAINS 21% OXYGEN



+ CARBON DIOXIDE = (CO_2)



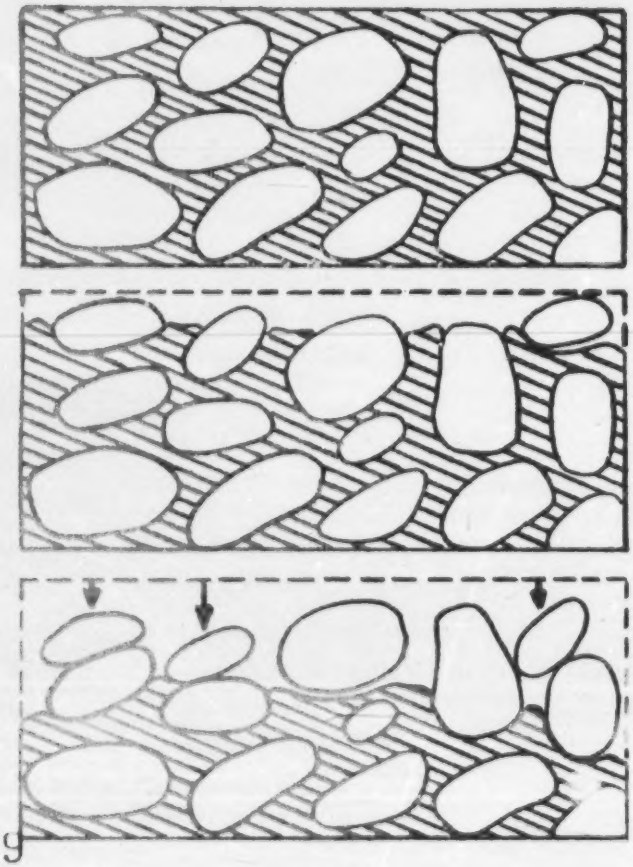
OXIDATION

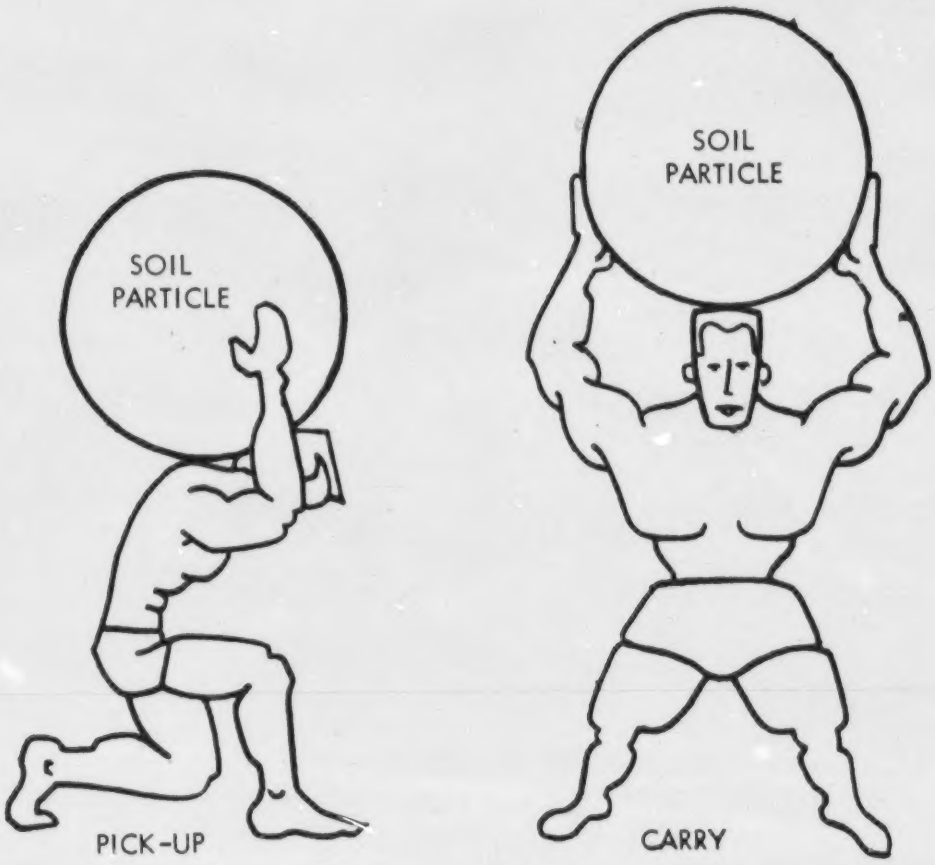
HYDRATION

CARBONIC ACID

CARBONATION

SOLUTION





EROSION

After the breakdown, (weathering), of rock material into smaller and smaller particles, and with the addition of air, water, and decaying plant and animal materials, the soil which results is then capable of making valuable contributions in the support of man and his methods of making a living. However, where there is soil, especially UNCOVERED soil, there is erosion. (The three basic types of erosion are: (1) SHEET EROSION - the top several layers of particles over a large area are removed, (2) RILL EROSION - miniature gullies up to 10 inches deep, and (3) GULLYING - a channel whose depth is measured in feet rather than inches.) Erosion is defined as the "pick-up and carry" of soil particles. There are four methods of moving soil particles. GRAVITY is definitely the most common over the entire earth. The remaining three are; MOVING water, MOVING air, and MOVING ice. In climates such as ours, except for gravity, moving water is probably the most common agent of erosion. Some natural erosion is bound to occur. However, unnecessary man-caused erosion as a result of plowing, over-grazing, or use of forest resources without reforesting, has cost man unnumbered acres of producing land. While it takes 500 years for nature to form one inch of topsoil, it takes only a few short years for man to allow 500 years of natural soil formation to be washed down our river drainage system. Since soil is an irreplaceable natural resource, this type of erosion must be stopped! This can only be done by a wiser management of the land resources which still remain. This is the responsibility of each and every citizen.

DECOMPOSITION or CHEMICAL WEATHERING includes:

CARBONATION	Certain elements unite with CARBONIC ACID (water + carbon dioxide) and the chemical reaction which results weathers the rocks apart.
HYDRATION	Hydration is the taking on of water in chemical combination; the accompanying "swelling", or increase in bulk, causes the rocks to "give" and fall apart.
OXIDATION	When oxygen in the air unites with certain elements in the rocks causing the original material to weaken and rot.
SOLUTION	Solution is the removal of materials which cement the rock particles together.

DIFFERENTIAL WEATHERING Under a given set of conditions, different kinds of rock will ordinarily weather at different rates because of differences in mineral composition and the degree of ease with which water may penetrate into the rock. Even on an outcrop of a single type of rock the rate of weathering may vary from place to place, either because of minor variations in the composition or texture or because of local differences in the numbers and sizes of joints and crevices that allow penetration of water. If the weathered material is continually being removed, the places of most rapid weathering gradually are etched out to form low spots in the surface, while places where weathering is particularly slow come to stand above the rest.

ELEMENT A substance which has resisted being broken down by CHEMICAL means. Of the 92 known chemical elements which exist in the earth's crust, only 8 are really abundant. These 8 elements make up 98% of the known crust of the earth. They are: OXYGEN - 47%; SILICON - 28%; IRON - 5%; CALCIUM - 4%; and SODIUM, POTASSIUM, and MAGNESIUM - 2-3% each.

EROSION Is the "pick up and carry" process of weathered materials.

FAULTING The displacement (which means to put out of place, move from its usual place or position) of large blocks of the earth's crust along cracks in the earth called joints.

FOLDING Is the wrinkling of the earth's crust, in tight folds, very much like a corrugated roof.

HUMUS It is important to note that the humus is PARTIALLY decayed organic matter; if decay is complete, there is no humus. Humus is usually black in color.

IGNEOUS ROCKS Igneous rocks are those which are molten or have cooled and become solid after being in a molten state. Such rocks are formed within the earth, where temperatures are high enough to melt solid rock. As they cool and solidify, there is time for crystals to grow to relatively large sizes and there the rocks are usually coarse grained. Common examples are: GRANITE and BASALT.

JOINT Also, cracks or fractures. But in this case, the joints permit the water of the ground to circulate more freely within the rocks.

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METAMORPHIC ROCKS These are rocks which have undergone marked change from their original condition. Most of the change is the result of HEAT and PRESSURE happening occasionally as a result of burial within the earth, assisted by the cementing action of underground waters and quite often by crystal deformation. Changes include: SANDSTONE into QUARTZITE; LIMESTONE into MARBLE; and SHALE into SLATE.

MINERAL Any natural component (part) of the earth's crust. In minerals, the elements are united to form substances which are very different from any of the ingredient elements.

ORGANIC WEATHERING Expanding roots ferret out cracks and crevices and split the rocks; burrowing animals wedge, pry and remove materials.

SEDIMENTARY ROCKS These are made up of sediments, or particles. They represent the accumulation through time of layer on layer of deposited materials. Some are carried and laid down by the wind, others by moving water or glaciers. Most of them are finally laid down in the great accumulation basins of the oceans. Each depositional layer is a STRATUM, and a series of them are STRATA; hence sedimentary rocks are normally referred to as STRATIFIED. Common examples are: SANDSTONE, LIMESTONE, SHALE, and CONGLOMERATE.

STRATA Two or more associated stratum; a series of layers.

STRATUM A single depositional layer.

VOLCANISM Has to do with molten rock which may become a volcano or a lava flow or any number of structures UNDER the earth's surface crust.

WEATHERING Is simply the breaking up of rocks by chemical and mechanical means. Basically it is making little pieces of rock out of big ones.

VOCABULARY FOR ECOLOGY AND WEATHER

CLIMATE The average weather conditions of an area
DECOMPOSERS Bacteria and fungi
ECOLOGY The study of living things and their environment
HABITAT The place where a living thing lives
HIBERNATE To spend the winter in a dormant or near dormant state
HUMUS Organic matter, partially decomposed, which is found in soils
PRODUCERS The green plants which supply the basic food for life
CONSUMERS The animals which subsist upon food produced by other organisms
DECIDUOUS A plant that sheds its leaves annually during the same growing season
CONIFERS Cone bearing plants
PARASITE An organism living on or within the body of another at the expense of the host.
WEATHER The general condition of the atmosphere at a particular time and place
ATMOSPHERE The air surrounding the earth
BACTERIA Non-green, one celled tiny organisms
FUNGI or FUNGUS A group of plants including mildew, molds, mushrooms, rusts and toadstools. They have no leaves, flowers, or green color
ENVIRONMENT All the conditions which surround a living thing
ORGANISM Any living thing
FAUNA The animals living in a certain place
MAXIMUM The highest degree or point recorded
MINIMUM The lowest degree or point recorded
HUMIDITY The amount of moisture the air can hold at a certain temperature
BAROMETER An instrument for measuring atmospheric pressure
THERMOMETER An instrument for measuring temperatures
ATMOSPHERIC PRESSURE The pressure due to the weight of the earth's atmosphere
PRECIPITATION Rain, snow, sleet or moisture

1. What percentage of the earth is land?
   (1) _____

2. What three things come entirely from the sun and the soil?
   (1) _____
   (2) _____
   (3) _____

3. Give two reasons why soil is necessary.
   (1) _____
   (2) _____

4. What are the four soil parts?
   (1) _____
   (2) _____
   (3) _____
   (4) _____

5. Name the most important source of mineral material.
   (1) _____

6. Another word that means the breakdown of rocks into smaller and smaller pieces.
   (1) _____

7. Give three examples of the above.
   (1) _____
   (2) _____
   (3) _____

8. This is formed when rain and carbon dioxide combine.
   (1) _____

9. List the four kinds of chemical weathering.
   (1) _____
   (2) _____
   (3) _____
   (4) _____

10. What happens when water freezes?
    (1) _____

11. List the two most common elements found in the earth's crust.
    (1) _____
    (2) _____

12. List the six other elements and percentages commonly found in the earth's crust.
    (1) _____
    (2) _____
    (3) _____
    (4) _____
    (5) _____
    (6) _____

13. Name three primitive plants.
    (1) _____
    (2) _____
    (3) _____

14. What are these plants called?
    (1) _____

15. Three things that aid the decay process.
    (1) _____
    (2) _____
    (3) _____

16. What are they called? (1) _____

17. What is another word for dead and decaying plant and animal material and organic wastes? (1) _____

18. List the five layers in the soil profile.
(1) _____
(2) _____
(3) _____
(4) _____
(5) _____

19. Which of these layers are the"true soil" layers?
(1) _____
(2) _____
(3) _____

20. How deep is the average soil? (1) _____

21. How deep is the average topsoil? (1) _____

22. How long does it take nature to form one inch of topsoil? (1) _____

23. Where is it easiest for erosion to happen? (1) _____

24. List three kinds of erosion.
(1) _____
(2) _____
(3) _____

25. How is erosion defined? (1) _____
_____

26. What are four ways of moving soil particles?
(1) _____
(2) _____
(3) _____
(4) _____

27. Besides gravity what is the most common agent of erosion in our climate? (1) _____

28. What kind of natural resource is soil? (1) _____

WEATHER
HOW TO ESTIMATE WIND SPEED

Name of Wind	Speed Miles per Hour	Specifications
Calm	Less than 1	Smoke rises straight up. Trees and bushes do not move. A lake looks as smooth as a mirror.
Light Air	1 to 3	Wind direction shown by drift of smoke, but not by wind vane. Tree leaves barely move.
Light Breeze	4 to 7	Wind felt on face. Leaves rustle slightly. Ordinary wind vane moves.
Gentle Breeze	8 to 12	Leaves and twigs in constant motion. Wind extends light flags.
Moderate Breeze	13 to 18	Dust, loose paper, and small branches are moved.
Fresh Breeze	19 to 24	Small limbs in trees begin to sway. Dust clouds raised. Crested wavelets form on inland waters.
Strong Breeze	25 to 31	Large branches in motion. Whistling heard in wires. Umbrellas used with difficulty.
Moderate Gale	32 to 38	Whole trees in motion. Inconveniance felt in walking against wind.
Fresh Gale	39 to 46	Twigs break off trees. Walking is impeded.
Strong Gale	47 to 54	Slight structural damage occurs. Chimney pots and slate blown off.
Whole Gale	55 to 63	Seldom experienced inland. Trees uprooted. Considerable structural damage inflicted.
Storm	64 to 74	Rarely experienced. Widespread damage.
Hurricane	75 or more	Excessive damage and destruction.

NOTE: A wind of 75 miles an hour or more is said to be of hurricane force, although it may not be associated with a hurricane itself.

0065

WIND ADDS BITE TO COLD

In summer we blame the humidity more than the heat for our discomfort. Why, then, when winter comes around, don't we blame something other than the cold for our misery? That "something" is very real and very important. It is the wind.

The wind is the hammer that drives the nail. The harder it blows, the greater penetration of the cold. Wind provides the force that gives cold air its painful barbs. Wind propels cold air through cracks and crevices of buildings to make them colder than they should be. Wind drives cold air agonizingly against the skin and into the lungs.

Before you venture outdoors, find out the wind strength as well as the temperature. Only then can you know what precautions to take to protect your ear, feet or even your respiratory system. The increase in the wind velocity causes your body to lose heat faster, therefore, you are colder. Skin exposed to cold wind can be dangerous.

The Army, concerned with frostbite injury to its troops in the Polar regions, did extensive research into what it called wind chill. Some of the findings were surprising.

For instance, if the temperature is a mild 39 degrees but the wind is blowing at 35 miles an hour, the cold effect on exposed skin is a temperature of 38 degrees below zero on a calm, windless day. Even if the temperature is 51 degrees, a 45 mile an hour wind would have a wind chill effect of a temperature 27 degrees below zero. Only a slight wind is required to give a strong force to cold air. A 3 mile an hour breeze gives air at 57 degrees a wind chill equivalent of still air at 23 degrees.

People should either be adequately dressed against the cold and wind or avoid getting into situations in which they would be dangerously exposed. If your car stalls on a windy day, are you sufficiently protected so that you may safely set out on foot for help? Many motorists have suffered serious injuries, even death, because they were not. If you are going on a hike, will you survive if the wind picks up or if you become lost? Wear several layers of clothes in order to trap warm air between the layers to keep you warm.

To assist its soldiers, and others who want to take advantage of its research, the Army issues a wind chill chart which is on the following page. The equivalent temperatures refer to how the wind feels or affects exposed skin.

Adapted from
The Curious Naturalist

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WIND CHILL CHART

(1) Read across to locate number closest to WIND FORCE (MILES PER HOUR)

WIND FORCE (MILES PER HOUR)	45	35	25	20	15	10	5	3	2	1
(2) READ DOWN COLUMN TO NUMBER CLOSEST TO OUTSIDE TEMPERATURE										
90	89	89	88	88	88	87	87	86	84	(3) READ → ACROSS → TO → FIND → →
82	81	80	80	79	78	76	74	72	70	
72	71	69	68	67	65	60	57	53	47	
63	62	59	57	55	52	44	39	34	20	
51	49	47	45	42	38	28	18	11	0	
41	39	36	34	30	25	11	0	-9	-23	
30	28	25	23	18	11	-5	-16	-40	-40	

EQUIVALENT TEMPERATURE
83
60
23
-11
-27
-38
-40

GENERAL RULES FOR FORECASTING

Look for fair weather to continue if:
Clouds tend to decrease in number
The winds blow gently from the directions of west to northwest
The temperature is normal for the time of year
The barometer is steady or slowly rising
The setting sun looks like a ball of fire and the sky is clear
The moon shines brightly and the wind is light
There is heavy dew or frost at night

Look for weather to change for the worse if:
Cirrus clouds change into cirrostratus, and cloudiness thickens and darkness occurs to the west or southwest
Quickly moving clouds increase in number and lower in elevation
Clouds move in various directions at different elevations
Clouds move from the south and the southerly wind increases in speed
The sky is clear at sunset, the wind speed light, and the air moist (look for fog)
The wind blows strongly in the morning
The temperature rises conspicuously in the winter
The barometer falls steadily
There is a hard rainfall at night

Look for clearing weather when:
A cloud filled sky shows signs of clearing up
The barometer rises rapidly
The wind shifts to a westerly direction

Look for rain or snow when:
18 to 36 hours after the first cirrus clouds are spotted in the sky (provided they thicken and give way to lower clouds)
12 to 24 hours after cirrus clouds thicken into cirrostratus and a halo is seen around the sun or moon
Within 6 hours when the morning temperature is high, the air is moist and sticky
Within 1 hour in the afternoon when there are swelling cumulus clouds overhead, and a dark sky to the southwest

Look for the temperature to fall when:
The wind continues to blow from the north or northwest
The pressure rises (in winter)
The wind is light and the evening sky is clear
The wind shifts into the north or northwest

Look for the temperature to rise when:
The sky is filled with clouds at night and there's a moderately southerly wind
The sky is clear all day and the wind is from the south
The wind shifts from the northwest to the south

0068

WEATHER READINGS

Day_____

Noon_____Afternoon_____Evening_____

_____

The minimum temperature yesterday was 1._____degrees and occurred at 2._____. The maximum temperature yesterday was 3._____degrees and occurred at 4._____. The barometric pressure is 5._____inches and 6._____. The wind is coming out of the 7._____ at 8._____ miles per hour. The present temperature is 9._____degrees. The dry bulb temperature is 10._____degrees. The wet bulb temperature is 11._____degrees. The difference is 12._____degrees. The relative humidity is 13._____per cent. The cloud type is 14._____. The amount of cloud type is 15._____per cent. The visibility is 16._____ and reduced by 17._____. The precipitation type was 18._____and measured 19._____of an inch. The fire danger today is 20._____.

The prediction is 21._____

_____

_____

_____

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Relative Humidity, Per Cent—Fahrenheit Temperatures

Dry Bulb temp.	Difference (Wet Bulb Depression)																			
t	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5
20	92	85	77	70	62	55	48	40	33	26	19	12	5								
21	92	85	78	71	63	56	49	42	35	28	21	15	8	1							
22	93	86	78	71	65	58	51	44	37	31	24	17	11	4							
23	93	86	79	72	66	59	52	46	39	33	26	20	14	7	1						
24	93	87	80	73	67	60	54	47	41	35	29	22	16	10	4						
25	94	87	81	74	68	62	55	49	43	37	31	25	19	13	7	1					
26	94	87	81	75	69	63	57	51	45	39	33	27	21	16	10	4					
27	94	88	82	76	70	64	58	52	47	41	35	29	24	18	13	7	2				
28	94	88	82	76	71	65	59	54	48	43	37	32	26	21	15	10	5				
29	94	88	83	77	72	66	60	55	50	44	39	34	28	23	18	13	8	3			
30	94	89	83	78	73	67	62	56	51	46	41	36	31	26	21	16	11	6	1		
31	94	89	84	78	73	68	63	58	52	47	42	37	33	28	23	18	13	8	4		
32	95	89	84	79	74	69	64	59	54	49	44	39	35	30	25	20	16	11	7	2	
33	95	90	85	80	75	70	65	60	56	51	46	41	37	32	27	23	18	14	9	5	0
34	95	90	86	81	76	71	66	62	57	52	48	43	38	34	29	25	21	16	12	8	3
35	95	91	86	81	77	72	67	63	58	54	49	45	40	36	32	27	23	19	14	10	6
36	95	91	86	82	77	73	68	64	60	55	51	46	42	38	34	29	25	21	17	13	9
37	95	91	87	83	78	74	69	65	61	57	53	48	44	40	36	31	27	23	19	15	11
38	96	91	87	83	79	75	70	66	62	58	54	50	46	42	37	33	29	25	21	17	14
39	96	92	87	83	79	75	71	67	63	59	55	51	47	43	39	35	31	27	24	20	16
40	96	92	87	83	79	75	71	68	64	60	56	52	48	45	41	37	33	29	26	22	18
41	96	92	88	84	80	76	72	69	65	61	57	54	50	46	42	39	35	31	28	24	20
42	96	92	88	85	81	77	73	69	65	62	58	55	51	47	44	40	36	33	30	26	23
43	96	92	88	85	81	77	73	70	66	63	59	55	52	48	45	42	38	35	31	28	25
44	96	93	89	85	81	78	74	71	67	63	60	56	53	49	46	43	39	36	33	30	26
45	96	93	89	86	82	78	74	71	67	64	61	57	54	51	47	44	41	38	34	31	28
46	96	93	89	86	82	79	75	72	68	65	61	58	55	52	48	45	42	39	35	32	29
47	96	93	89	86	82	79	75	72	69	66	62	59	56	53	49	46	43	40	37	34	31
48	96	93	90	86	83	79	76	73	69	66	63	60	57	54	50	47	44	41	38	35	32
49	96	93	90	86	83	80	76	73	70	67	64	61	57	54	51	48	45	42	39	36	34
50	96	93	90	87	83	80	77	74	71	67	64	61	58	55	52	49	46	43	41	38	35
51	97	94	90	87	84	81	78	75	71	68	65	62	59	56	53	50	47	45	42	39	36
52	97	94	90	87	84	81	78	75	72	69	66	63	60	57	54	51	49	46	43	40	37
53	97	94	90	87	84	81	78	75	72	69	66	63	61	58	55	52	50	47	44	41	39
54	97	94	91	88	85	82	79	76	73	70	67	64	61	59	56	53	50	48	45	42	40
55	97	94	91	88	85	82	79	76	73	70	68	65	62	59	57	54	51	49	46	43	41
56	97	94	91	88	85	82	79	76	73	71	68	65	63	60	57	55	52	50	47	44	42
57	97	94	91	88	85	82	80	77	74	71	69	66	63	61	58	55	53	50	48	45	43
58	97	94	91	88	85	83	80	77	74	72	69	66	64	61	59	56	54	51	49	46	44
59	97	94	91	89	86	83	80	78	75	72	70	67	65	62	59	57	55	52	49	47	45
60	97	94	91	89	86	83	81	78	75	73	70	68	65	63	60	58	55	53	50	48	46
61	97	94	92	89	86	84	81	78	76	73	71	68	65	63	61	58	56	54	51	49	47
62	97	94	92	89	86	84	81	79	76	74	71	69	66	64	61	59	57	54	52	50	47
63	97	95	92	89	87	84	82	79	77	74	71	69	67	64	62	60	57	55	53	50	48
64	97	95	92	90	87	84	82	79	77	74	72	70	67	65	63	60	58	56	53	51	49
65	97	95	92	90	87	85	82	80	77	75	72	70	68	66	63	61	59	56	54	52	50
66	97	95	92	90	87	85	82	80	78	75	73	71	68	66	64	61	59	57	55	53	51
67	97	95	92	90	87	85	83	80	78	75	73	71	69	66	64	62	60	58	56	53	51
68	97	95	92	90	88	85	83	80	78	76	74	71	69	67	65	62	60	58	56	54	52
69	97	95	93	90	88	85	83	81	79	76	74	72	70	67	65	63	61	59	57	55	53
70	98	95	93	90	88	86	83	81	79	77	74	72	70	68	66	64	61	59	57	55	53
71	98	95	93	90	88	86	84	81	79	77	75	72	70	68	66	64	62	60	58	56	54
72	98	95	93	91	88	86	84	82	79	77	75	73	71	69	67	65	63	61	59	57	55
73	98	95	93	91	88	86	84	82	80	78	75	73	71	69	67	65	63	61	59	57	56
74	98	95	93	91	89	86	84	82	80	78	76	74	71	69	67	65	63	61	60	58	56
75	98	96	93	91	89	86	84	82	80	78	76	74	72	70	68	66	64	62	60	58	56
76	98	96	93	91	89	87	84	82	80	78	76	74	72	70	68	66	64	62	61	59	57
77	98	96	93	91	89	87	85	83	81	79	77	74	72	71	69	67	65	63	61	59	57
78	98	96	93	91	89	87	85	83	81	79	77	75	73	71	69	67	65	63	62	60	58
79	98	96	93	91	89	87	85	83	81	79	77	75	73	71	69	68	66	64	62	60	58
80	98	96	94	91	89	87	85	83	81	79	77	75	74	72	70	68	66	64	62	61	59

WEATHER READINGS

Day_____

Noon_____Afternoon_____Evening_____

_____

The minimum temperature yesterday was 1._____degrees and occurred at 2._____. The maximum temperature yesterday was 3._____degrees and occurred at 4._____. The barometric pressure is 5._____inches and 6._____. The wind is coming out of the 7._____ at 8._____ miles per hour. The present temperature is 9._____degrees. The dry bulb temperature is 10._____degrees. The wet bulb temperature is 11._____degrees. The difference is 12._____degrees. The relative humidity is 13._____per cent. The cloud type is 14._____. The amount of cloud type is 15._____per cent. The visibility is 16._____and reduced by 17._____. The precipitation type was 18._____ and measured 19._____of an inch. The fire danger today is 20._____.

The prediction is 21._____

_____ _____

_____

_____

0071

CHECK BOOK

NAME _____ TRIBE _____

DEPOSITED _____

TOTAL SPENT _____

RETURNED _____

AMOUNT SPENT

Mon. _____

Tues. _____

Wed. _____

Thurs. _____

Total _____

CHECK #_____

Date _____

To _____

Amt. _____

Pay to the order of **Mohican Outdoor School** $_____

$_____

Mohican Bank

_____

Signed

_____

Tribe

CHECK #_____

Date _____

To _____

Amt. _____

Pay to the order of **Mohican Outdoor School** $_____

$_____

Mohican Bank

_____

Signed

_____

Tribe

CHECK #_____

Date _____

To _____

Amt. _____

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Signed

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Tribe

CHECK #_____

Date _____

To _____

Amt. _____

Pay to the order of **Mohican Outdoor School** $_____

$_____

Mohican Bank

_____

Signed

_____

Tribe

00072

MY NOTES

I said in my heart, "I am sick of
four walls and a ceiling.
I have need of the sky.
I have business with the grass.
I will up and get me away where the
hawk is wheeling,
Lone and high . . ."

Richard Hovey